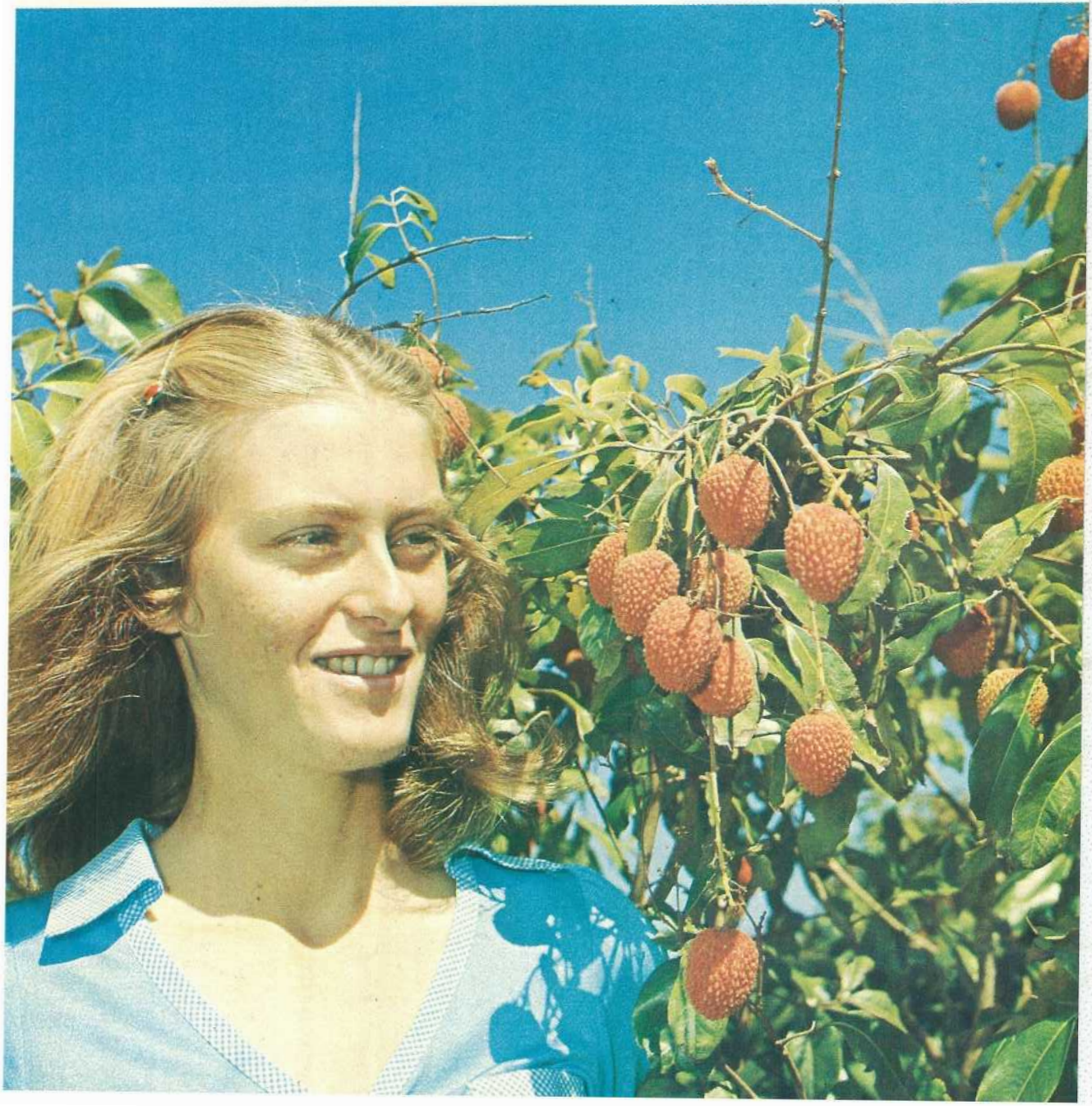
Queensland
AGRICULTURAL JOURNAL

MARCH 1977 VOL. 103 NO. 2



Fruit

SCHOOL PROJECT NOTES ...

Queensland is practically the sole Australian source of pineapples and most other tropical fruits, but in recent years has supplied only about a quarter of the Australian banana crop.

Pineapples, apples, citrus, and bananas are the most important Queensland fruit crops. They were worth $11 727 000, $9 785 000, $8 227 000, and $8 947 000, respectively, in 1974–75. Pineapples are produced chiefly in the coastal areas between Brisbane and Maryborough and in the Rockhampton district. Apples are restricted mainly to the Stanthorpe area while citrus fruits are grown fairly extensively in the coastal and sub-coastal areas, Gayndah, Maroochy, Maryborough, and Gatton being the most important districts. Bananas are grown mainly in the Albert, Pine Rivers, Caboolture, and Maroochy districts in south Queensland and in the area between Cardwell and Cairns in north Queensland.

Other tropical fruits, particularly papaws, custard apples, and mangoes, are grown throughout coastal Queensland. Papaws (2 348 tonnes in 1974–75) are grown chiefly in the Gladstone district as well as in rural areas around Brisbane and Maryborough, custard apples (220 tonnes in 1974–75) mainly in rural districts within 80 kilometres of Brisbane, and mangoes (1 139 tonnes in 1974–75) in the tropical coastal districts, particularly around Bowen.

Grapes, nearly all for table use, were worth $3 010 000. Stanthorpe (south of the Darling Downs) is the main area of production, and smaller quantities are grown at Roma and in the Moreton and Brisbane districts. In 1974–75, 232 888 litres of wine were made. The high country around Stanthorpe enables fruits of the cool temperate zone to be grown. In 1974–75 the State produced 38 344 tonnes of apples, 1 934 tonnes of peaches, 3 365 tonnes of pears, 2 789 tonnes of plums, 788 tonnes of apricots, and 623 tonnes of nectarines. The total value of these six fruits was $13 429 000 and the quantity was 47 843 tonnes.

This cover shows litchis growing at Walkamin Research Station.

QUEENSLAND AGRICULTURAL JOURNAL

Published every second month by Department of Primary Industries, William Street, Brisbane 4000.
Telephone 224 0414

Vol. 103 No. 2. MARCH–APRIL 1977

Contents

QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES

Successful tick control

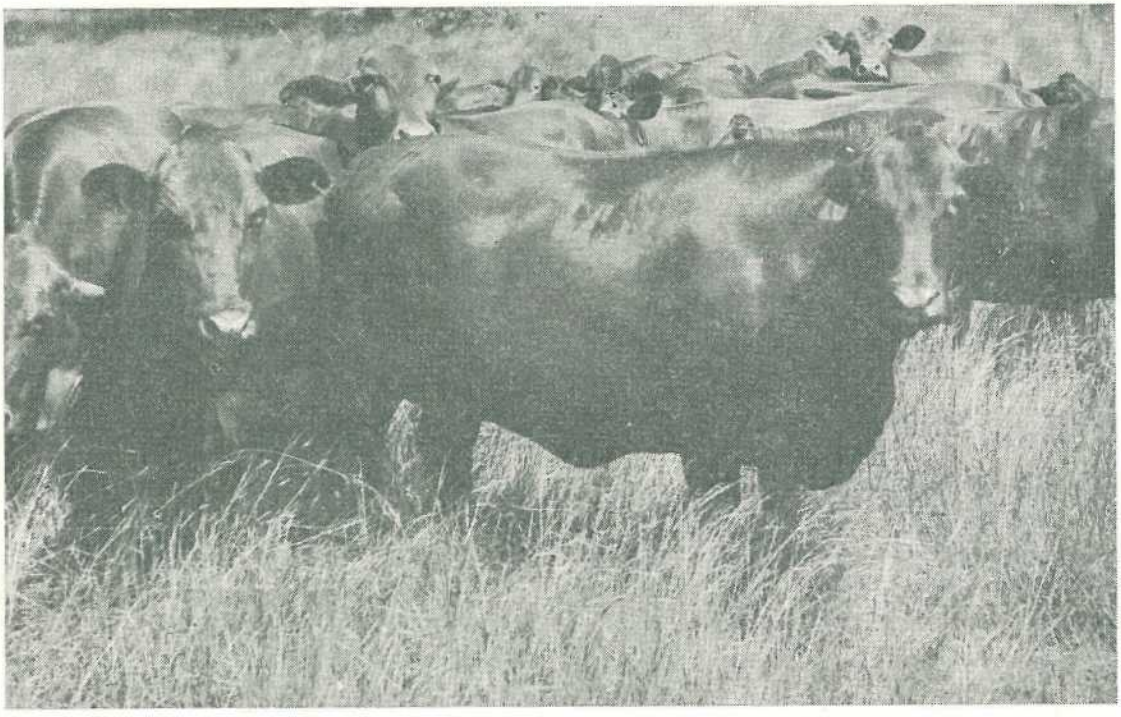
Harmony, tolerance and resistance

It is necessary to keep ticks under control for efficient production, but to rely solely on chemicals is expensive in tickicide and labour. Besides, it cannot be expected that chemicals will get any cheaper because of huge developmental costs. Also, while they are used excessively, resistance is encouraged to develop. The use of tick-resistant cattle, and chemical treatment when necessary, allows for an integrated approach to the problem. These two articles concern people who have successfully developed herds of tick-resistant cattle.

by F. R. Emmerson, Veterinary Services Branch.

PEACEFUL co-existence with cattle ticks is akin to living with any strong and sometimes aggressive enemy. Ticks have demonstrated their strength by dogged survival.

They have repeatedly sparked-off crises by overcoming the striking force of a variety of chemicals.



Sleek-coated breeders on 'Konjuli'. Minimal dipping using tick-resistant cattle helps Mr. and Mrs. Portas manage a 2430 ha Woolooga property without outside help. In the 1960s, they had a British breed herd and dipped 10 to 12 times annually.

is possible

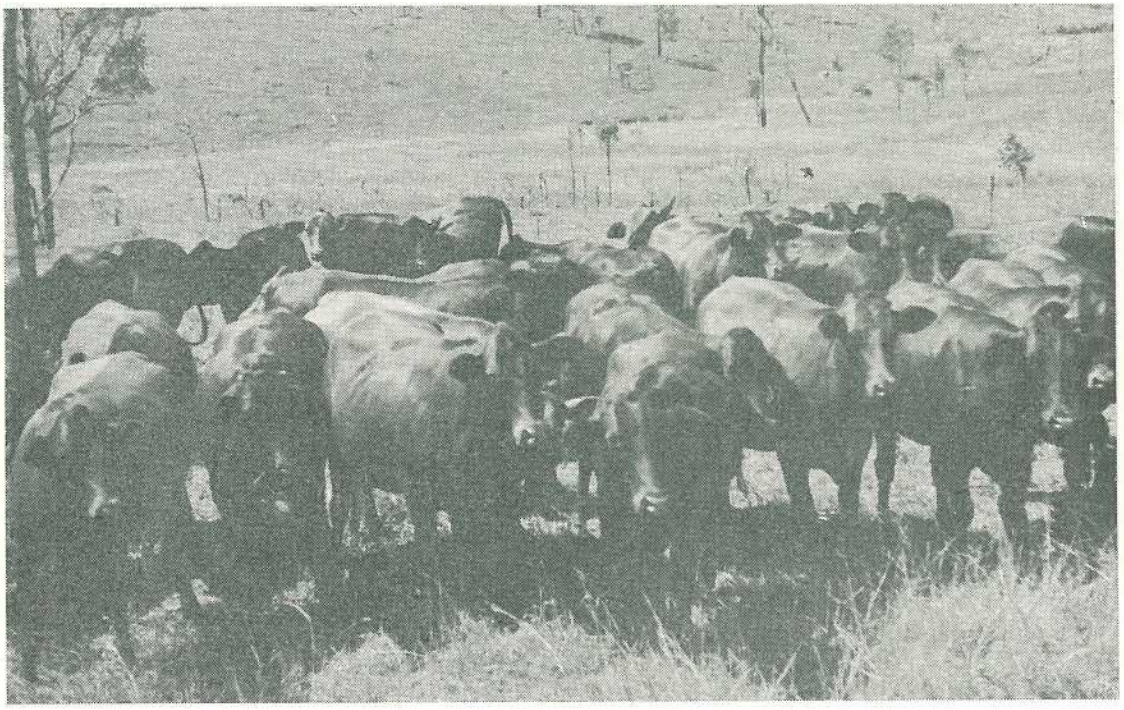
Nationwide eradication is not envisaged. The necessary manpower, finance and suitable strategy are not likely to be available for many years. Therefore, the cattle industries must face the reality of peaceful co-existence—living in harmony.

No such harmony exists under a regime of monotonous dipping. The balance of power is then with the ticks. Conversely, harmony can exist between ticks and Zebu (*Bos indicus*) cattle. This has been the case for centuries. Zebus depress tick numbers but also tolerate a few.

Harold and Ivy Portas of "Konjuli", Woolooga, rate this tolerance as a big factor in their herd of about 1 000 Droughtmasters. They claim that tolerance of some ticks has been as important as the moderation of tick numbers by host resistance.

Until the mid 1960s, their herd completely comprised British cattle (*Bos taurus*). For satisfactory production, ten to twelve dippings were required per annum. This left little time, finance, energy or incentive for other property development and personal pursuits.

To "go Droughtmaster" they purchased from established herds and simultaneously culled *Bos taurus* cattle. Droughtmasters have a blend of three-eights to five-eights Zebu and this is considered adequate to greatly assist tick control in subcoastal south-east Queensland. The breeding herd on Konjuli, now completely Droughtmaster, is only dipped up to three times per annum, whilst young



Young breeders on 'Konjuli' rarely require dipping for ticks.

growers are rarely treated. Moreover, the man and wife team are quite capable of handling this work without outside help.

Heavier culling for tick resistance could lower the dipping further but, to date, culling for temperament, conformation and calf rearing have received most attention.

Management of such Zebu cross herds demands an acquired knowledge of tick level in relation to coat and body condition—to know when tolerability is being over-stretched. April, May and early June appear to be the 'on guard' months. At this time, tick numbers peak. Observations suggest that tolerance in Zebu crosses may also drop temporarily about this time.

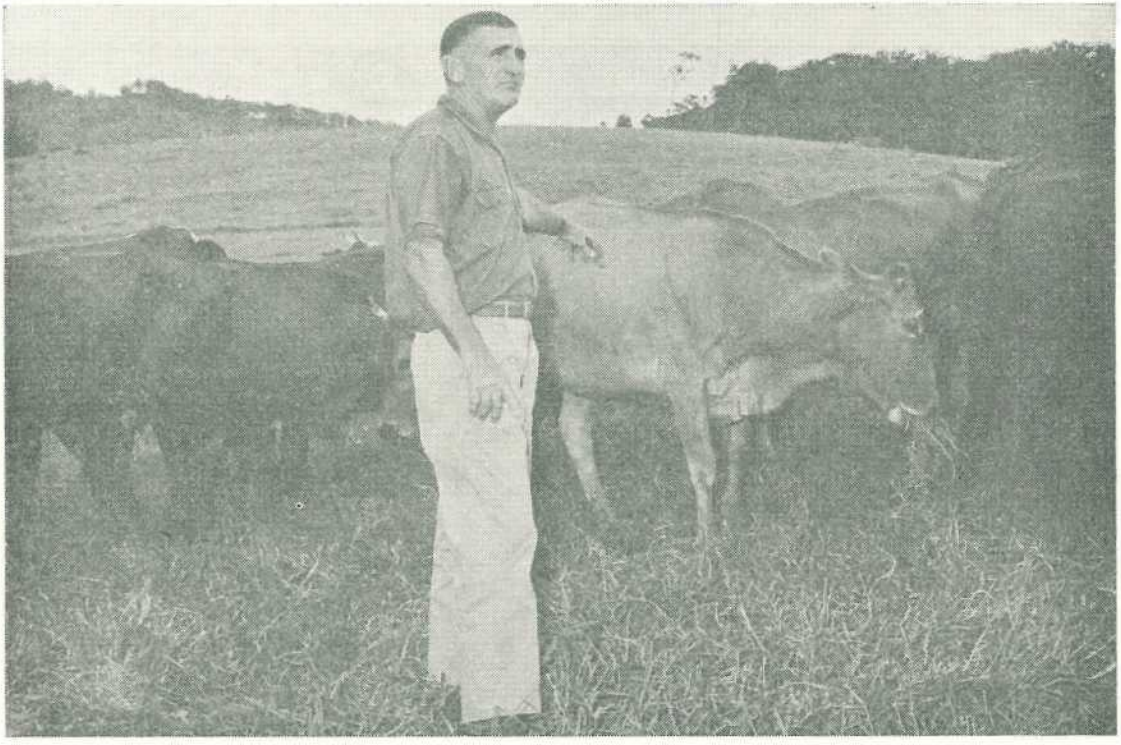
Comparable results could be expected with similar blends of Zebu and British or European breeds. The latter are quite essential to the maintenance of productivity.

Two and three breed crossing systems are suitable for those not wishing to breed straight-line cattle. Especially in the case of the three breed system, maximal heterosis and vigour are maintained. Such systems, though cumbersome and requiring extra paddocks, can be rewarding.

By way of example, Brahman cross Hereford cows are crossed with Droughtmaster bulls. Their progeny go to Hereford bulls and the next generation females to Brahman bulls. The cycle is then repeated.

Distasteful though it may be to have a mere parasite dictate a breeding policy there is logic in blending with Zebu. South Queensland especially is still lagging in this regard.

Resistant cattle



Mr. Richardson inspects tick-resistant breeders on his Pimpama property in south-east Queensland.

Tick control without dipping

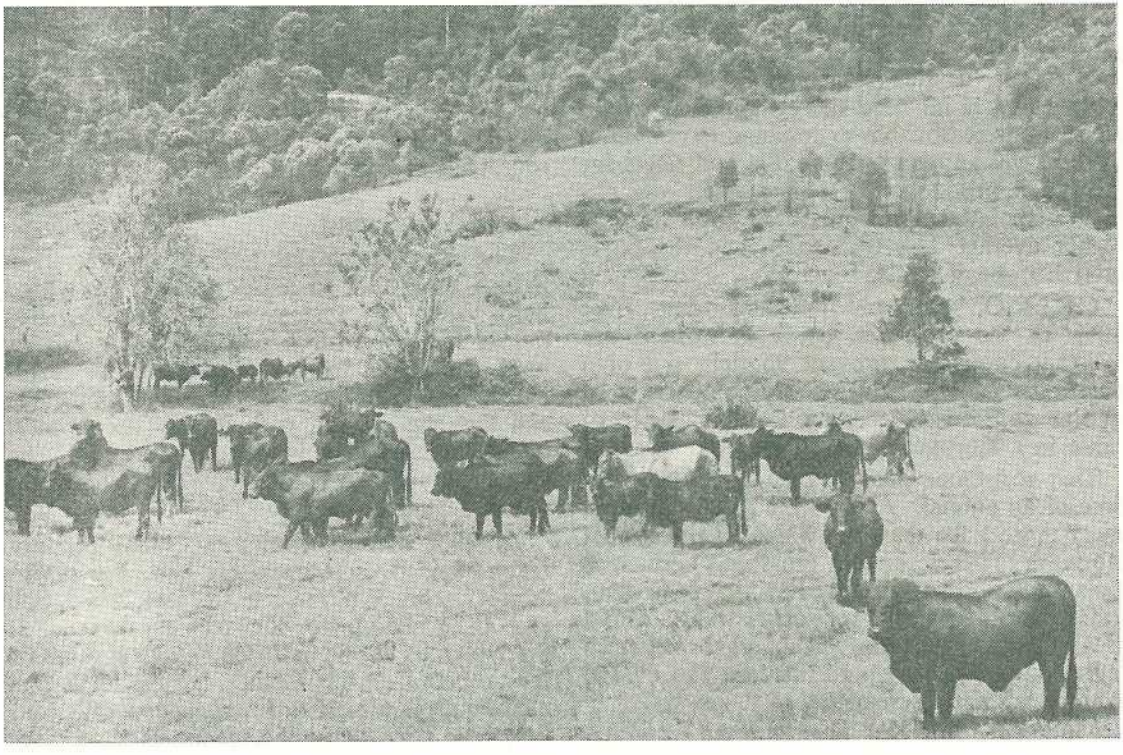
by J. F. Kearnan, Veterinary Services Branch.

VERY few cattle ticks and no dipping are the rewards for a Pimpama grazier's six year study of methods of breeding tick-resistant cattle.

The tick situation on Mr. Ern Richardson's 320 ha property, 'The Grange', is very different to that which occurred in the first six months of 1970 when 17 rounds of dipping failed to control the parasites satisfactorily.

The problem was caused by the development of one of Queensland's resistant strains of ticks, Mt. Alford. Although the problem was temporarily solved with the release of a new chemical, Mr. Richardson believed that the increasing problem of resistance to chemicals would continue to threaten his cattle enterprise.

win the tick war



In 1970, Mr. Richardson dipped his cattle 17 times in 6 months because of Mt. Alford type resistance in the cattle ticks. This herd has not been dipped once in 12 months.

Discussions with experts revealed that there were other ways to control ticks which were founded on ecological principles. These could be developed without relying on chemicals.

Spelling pastures had been shown to reduce tick numbers but it still relied on chemicals to clean the cattle thoroughly when moving between paddocks.

A more promising method was to exploit the natural resistance of some cattle to ticks. Ticks need to attach and feed on their hosts to progress through the three stages of their cycle—larvae, nymph, adult. This development period usually lasts about 21 days. Resistance to ticks is an acquired immunity which limits the number of larvae which can successfully develop to fully engorged adults.

Mr. Richardson believed that tick resistant cattle could permanently solve his tick problem. He was advised that some cattle breeds are recognised as being tick-resistant and some individual animals are more resistant than others. The Zebu (*Bos indicus*) cattle breeds —the Braham, Africander, Sahiwal and Sindi are more resistant than the European breeds (*Bos taurus*).

However, as tick resistance is highly heritable, there is no need to rely on Zebu blood alone. It is reasonable to combine the qualities of the Zebu and European cattle and select for increased production. It has been demonstrated that the Zebu crossbred cattle have a higher average tick resistance than the pure-bred European cattle.

C.S.I.R.O. research indicates that over 80% of the crossbred cattle in a herd are resistant enough to prevent 95 ticks out of a hundred reaching maturity. By comparison, a similar resistance occurred in only 10% of cattle in a European breed herd.

Tick resistance persists throughout the lifetime of an animal. A few 'tick bags' can often carry more ticks than the whole of the rest of the herd. Therefore, in a crossbred herd, it is logical to cull the relatively few 'tick bags' with resistance below 95 per cent. This would greatly reduce the numbers of engorged ticks falling to the pasture and increase the overall average of herd resistance.

Culling for tick resistance is done by visual appraisal of the cattle between January and March in southern Queensland. As most engorged ticks fall in early morning it is best to hold the cattle in yards overnight and assess the cattle soon after daybreak.

Late summer is the most suitable period as tick populations are naturally low in the spring and later winter months, and all cattle lose some of their tick resistance in the autumn.

The degree of resistance in crossbred cattle is relative and depends on the proportion of Zebu blood. A high percentage of Zebu blood is required in cattle in the wet tropics of the far north to counterbalance the heavier tick challenge. In southern Queensland, cattle with three-eighths to half Zebu blood will maintain tick populations at low levels with minimal dipping.

Before embarking on a programme to convert a European breed herd to a cross-bred herd, the crossbreeding system must be carefully planned. Besides a predetermined breeding plan and selection for tick resistance, selection should also be based on temperament, reproductive performance and conformation.

Breeders may either follow a straight breeding programme eventually changing over to a tropical breed (Droughtmaster, Santa Gertrudis, Braford, Brangus, Belmont Red) or continue to maintain the advantages of hybrid vigour through a two or three breed rotational crossing system.

Straight breeding

The most successful method to convert a British bred herd to a *Bos indicus* cross-bred herd using this system is to cross the *Bos taurus* females with a pure-bred *Bos indicus* bull. This cross will produce a breeder carrying 50% *Bos indicus* content. These breeders can then be crossed with one of the tropical breed bulls. A highly tick-resistant herd can be developed in a few years with normal culling of females.

Another method commonly used, but not recommended, is to cross the base *Bos taurus* females with a pure-bred tropical breed bull and to grade-up to the tropical breed. If three-eighths to one half *Bos indicus* is minimal for tick control, this method is slow. The first method gives a high *Bos indicus* content in the first year (one half); the second method gives only about three sixteenths, depending on the Zebu component of the tropical breed bull.

Rotational cross-breeding

Experimental work indicates that rotational cross-breeding is a better approach than straight breeding. Rotational cross-breeding, however, creates many more management problems. A two or three breed rotational cross system is the usual approach.

Two breed rotational cross

This system involves using two genetically diverse breeds as sires and mating heifers to the sire of opposite breeding. For example, Hereford cows mated to Brahman bulls; female progeny mated to Hereford bulls; female progeny mated to Brahman bulls.

Three breed rotational cross

This is an extension on the two breed cross with more of the original breed being replaced before re-using that breed. For example, three genetically diverse breeds, Brahman, Hereford, Droughtmaster are selected. Hereford cows are mated to Brahman bulls; female progeny mated to Droughtmaster bulls; female progeny mated to Hereford bulls; female progeny mated to Brahman bulls.

This system can be applied only when a reasonable standard of cattle control has been achieved through sub-division of a property. Given this basic development, group identification of female progeny is the extra management problem.

Whatever cross-breeding system is adopted, it is imperative that the original susceptible European breeders be sold as soon as practical. C.S.I.R.O. has noted that when susceptible cattle are run in conjunction with resistant cattle, the resistant cattle carry many more ticks than when they are run separately.

Ern Richardson adopted the straight breeding system using Sahiwal bulls and did not permit the *Bos indicus* content to drop below three-eighths.

When Officers of the D.P.I. and C.S.I.R.O. inspected Ern's herd during April 1975, very few ticks could be seen. The herd had not been dipped for over a year.

Mr. Richardson has saved a lot of money by converting his herd. Acaricides are a major beef production cost in the tick infested areas of Queensland, and their future supply is not guaranteed. Included in this liability is the cost of labour for mustering for the sole purpose of tick control. This can cost about $5.00 per head per annum.

The use of Zebu cross cattle has the added advantage that the time and effort spent on dipping and mustering can be channelled into other aspects of cattle husbandry and property improvement.

Except for the Government regulations which require all travelling store cattle to be dipped within the previous 72 hours, it appears that Mr. Ern Richardson has two plunge cattle dips which are unnecessary.

EDITOR'S NOTE

Owing to recent research developments, the following information should be considered in relation to the article: *Successful tick control is possible* by F. J. Emmerson.

"Recent studies indicate that tick resistant cattle may tolerate the presence of ticks simply by letting less mature on them. Thus they escape the main effect. More maturing ticks means less tolerance.

A slightly different situation may exist with internal parasites where there is some evidence that equal parasite burdens may have variable effects on individuals."

Of particular interest

Items of news recently released by the Minister for Primary Industries, the Hon. V. B. Sullivan, M.L.A.

Wider powers to eradicate neglected bananas

OWNERS of banana plantations in which leaf spot disease is not being controlled satisfactorily now can be forced to destroy the plants.

New legislation has been gazetted under the Diseases in Plants Act. This has armed Inspectors with wider powers and they can order the eradication of plants carrying more than a specified level of leaf spot.

Leaf spot is a major problem in North Queensland and, although my Department has been able to develop a very satisfactory method of control, it involves growers in regular spraying programmes.

This adds appreciably to their costs of production.

If a grower fails to carry out regular spraying for leaf spot control, the disease will build up quickly and reduce the plantation to an uneconomic and neglected condition. It then provides a source of infection for other plantations in the area, and this reduces considerably the effectiveness of the spraying carried out by the conscientious growers.

Parthenium now a prohibited weed seed

PARTHENIUM Weed, which has become a serious problem of agricultural and pastoral lands in Queensland, particularly in the central areas of the State, has been designated a prohibited weed seed under the Agricultural Standards (Seeds) Regulations of 1969.

Parthenium weed is a weed of sub-tropical regions of the world which was accidentally introduced into Queensland about 1963.

Over the next ten years, this plant spread alarmingly during mild winters and above-average rains.

Invasion of broad acre agricultural lands has been extensive and some infestations above 10 000 hectares have been recorded in the sub-coastal regions of Central Queensland.

From the Government's point of view, this weed has become the subject of an intensive research and control programme.

A lot of money has been made available in an effort to control its spread.

Parthenium weed seeds have not yet been found in crop or pasture seed harvested for sowing, but it is highly likely that this would occur at some stage.

The elimination of parthenium from crop and pasture seeds would be a useful element in the control programme.

Collee and Flegler

two new Soybean varieties for Southern and Central Queensland

by J. L. ROSE and A. J. P. WILLIAMSON, Agriculture Branch.

IN April 1976, the Department of Primary Industries released two new soybean varieties. They were Collee an early maturing variety, and Flegler, a mid-late maturing type.

Flegler was named in honour of the late Charles Flegler (decd. 1971), former Vice-President of the Queensland Graingrowers' Association. He fostered the growing of soybeans in Queensland but died about the time the industry started to expand rapidly.

The two varieties were bred at Hermitage Research Station and have been tested, since the 1972-73 season, throughout southern and central Queensland as the lines H.R.1 and 70/50.

Parentage and agronomic characteristics

Collee. This variety originated as an F_6 selection from the cross Hill x Lee. Collee is erect, has determinate flowering and is resistant to lodging. It has tawny pubescence and purple flowers which appear one or two days earlier than those of Hill in December plantings. However, Collee matures at the same time as Hill. Compared with Hill, Collee has much improved resistance to pod shattering. The seeds are large, shiny, yellow and have a black hilum. Collee is resistant to the leaf diseases, bacterial pustule (*Xanthomonas phaseoli* var. *sojense*), and wildfire (*Pseudomonas tabaci*).

Flegler. This variety originated as a selection from the segregating population arising from a natural cross in the American variety Roanoke. Flegler is an erect variety with determinate flowering and resistance to lodging. When planted in December in south-eastern Queensland its maturity is slightly later than Davis but earlier than Wills. Flegler has tawny pubescence and purple flowers. The pods, which are normally carried at heights greater than 12 cm, are resistant to shattering when mature. The seeds are straw yellow with a black hilum. This variety is also resistant to the leaf diseases, bacterial pustule, and wildfire.

Yields

The yield performance of Collee in comparison with Hill, during the seasons 1972–73 to 1974–75, is recorded in Table 1. In the 44 comparisons made, the yields of Collee and Hill were almost identical.

The yield performance of Flegler, compared with Bragg, Davis, Wills, Hampton and Semstar over the same seasons, is presented in Table 2. In these comparisons Flegler gave the highest yields overall in all regions excepting the South Burnett.

Seed quality

The mean protein content of Collee is about one per cent higher than that of Hill with the biggest differences occurring under irrigation (Table 3).

The mean protein content of Flegler is marginally lower than Wills, a little better than Davis and Bragg and much superior to Hampton and Semstar (Table 4).

Oil content of Collee is about half of one per cent lower than Hill (Table 5) while Flegler's oil content is slightly inferior to Davis, Bragg and Hampton but equal to that of Wills, and Semstar (Table 6).

Late plantings

In tests determining suitability for very late plantings neither Collee nor Flegler gave good yields.

Conclusions

While Collee shows little or no yield advantage over Hill its superior resistance to lodging and shattering will result in a larger percentage of the yield being harvested. It should prove most suitable for rain-grown conditions on the eastern Darling Downs. Under these conditions economic yields can be expected from early maturing varieties, such as Collee, though they may not have as high a yield potential as later maturing varieties. Yields from later maturing varieties tend to fluctuate widely from year to year depending on weather conditions.

Under irrigation, Collee will be used mainly where an early harvest is desired to fit in with special crop rotation practices.

In view of its high yielding capability and resistance to lodging and shattering, Flegler can be safely used as a replacement for any of the mid-late maturing varieties.

Both Collee and Flegler, however, are not suited to late planting. It is, therefore, recommended that neither be planted later than early January on the Darling Downs, or mid January in the West Moreton, the South Burnett or central Queensland.

TABLE 1

YIELD COMPARISONS BETWEEN COLLEE AND HILL IN REGIONAL VARIETY TRIALS 1972–73 TO 1974–75

Varieties	Darling Downs (rain-grown) (12)	Darling Downs (irrigated) (11)	West Moreton (9)	South Burnett (5)	Central Queensland (7)	Means (44)
COLLEE	1 194	1 903	2 654	1 854	1 936	1 863
Hill	1 182	1 903	2 676	1 757	1 923	1 851

Figures in parenthesis indicate the number of trials involved.

TABLE 2

YIELD COMPARISONS BETWEEN FLEGLER AND OTHER VARITIES IN REGIONAL VARIETY TRIALS 1972–73 TO 1974–75

Varieties	Darling Downs (rain-grown)	Darling Downs (irrigated)	West Moreton	South Burnett	Central Queensland	Means
FLEGLER	1 229 (12)	2 350 (12)	3 232 (9)	1 941 (5)	2 075 (9)	2 137 (47)
Bragg	1 217 (12)	2 310 (12)	3 021 (9)	1 922 (5)	1 978 (9)	2 062 (47)
Davis	1 191 (12)	2 250 (12)	3 132 (9)	1 954 (5)	1 909 (9)	2 052 (47)
Wills	1 128 (12)	2 256 (12)	2 977 (9)	1 778 (5)	1 903 (9)	1 987 (47)
Hampton	1 122 (12)	2 283 (11)	2 781 (9)	1 901 (5)	1 669 (8)	1 921 (45)
Semstar	1 095 (12)	2 152 (10)	2 760 (9)	1 724 (5)	1 942 (9)	1 902 (45)

Figures in parenthesis indicate the number of trials in which the variety was tested.

TABLE 3

COMPARISON OF SEED PROTEIN PERCENTAGES BETWEEN COLLEE AND HILL IN REGIONAL VARIETY TRIALS 1972–73 TO 1974–75

Varieties	Darling Downs (rain-grown) (11)	Darling Downs (irrigated) (11)	West Moreton (8)	South Burnett (5)	Central Queensland (6)	Means (41)
COLLEE	43·4	42·6	42·2	42·9	39·9	42·4
Hill	43·3	41·1	40·7	41·5	40·3	41·5

Figures in parenthesis indicate the number of trials in which the variety was tested.

TABLE 4

COMPARISON OF SEED PROTEIN PERCENTAGES BETWEEN FLEGLER AND OTHER VARITIES IN REGIONAL VARIETY TRIAL 1972–73 TO 1974–75

Varieties	Darling Downs (rain-grown)	Darling Downs (irrigated)	West Moreton	South Burnett	Central Queensland	Means
Wills	43·4 (11)	41·5 (12)	42·9 (8)	43·3 (5)	41·1 (6)	42·4 (42)
FLEGLER	43·5 (12)	41·6 (12)	42·3 (8)	43·1 (5)	39·6 (6)	42·2 (43)
Davis	43·3 (11)	40·8 (11)	41·9 (8)	42·3 (5)	40·1 (6)	41·8 (41)
Bragg	43·1 (11)	41·4 (11)	41·7 (8)	41·5 (5)	39·8 (6)	41·7 (41)
Hampton	42·9 (12)	40·6 (11)	40·9 (8)	41·5 (5)	39·5 (5)	41·3 (41)
Semstar	42·3 (11)	39·9 (10)	41·0 (8)	41·0 (5)	39·0 (6)	40·8 (40)

Figures in parenthesis indicate the number of trials in which the variety was tested.

TABLE 5

COMPARISON OF SEED OIL PERCENTAGES BETWEEN COLLEE AND HILL IN REGIONAL VARIETY TRIALS 1972–73 TO 1974–75

Varieties	Darling Downs (rain-grown) (12)	Darling Downs (irrigated) (11)	West Moreton (7)	South Burnett (5)	Central Queensland (6)	Means (41)
Hill	18·2	20·1	20·1	19·9	19·7	19·5
COLLEE	18·1	19·4	19·5	19·4	19·2	19·0

Figures in parenthesis indicate the number of trials in which the variety was tested.

TABLE 6

COMPARISON OF SEED OIL PERCENTAGES BETWEEN FLEGLER AND OTHER VARITIES IN REGIONAL VARIETY TRIALS 1972–73 TO 1974–75

Varieties	Darling Downs (rain-grown)	Darling Downs (irrigated)	West Moreton	South Burnett	Central Queensland	Means
Davis	18·6 (12)	20·8 (12)	20·4 (7)	20·1 (5)	20·1 (6)	19·9 (42)
Bragg	18·5 (12)	20·5 (12)	20·2 (7)	20·3 (5)	20·4 (6)	19·8 (42)
Hampton	18·5 (12)	20·6 (11)	20·5 (7)	19·8 (5)	20·4 (5)	19·8 (40)
FLEGLER	18·3 (12)	20·1 (12)	20·0 (7)	20·2 (5)	20·0 (6)	19·6 (42)
Wills	18·3 (12)	20·2 (12)	20·5 (7)	20·1 (5)	19·8 (6)	19·6 (42)
Semstar	18·2 (12)	20·2 (10)	20·3 (7)	20·4 (5)	19·9 (6)	19·6 (40)

Figures in parenthesis indicate the number of trials in which the variety was tested.

MORE THAN YOU NEED?

IF you find yourself with unwanted pesticide, either in the original container or in a spray vat, you should try to offer this material to a responsible person who may have need of it.

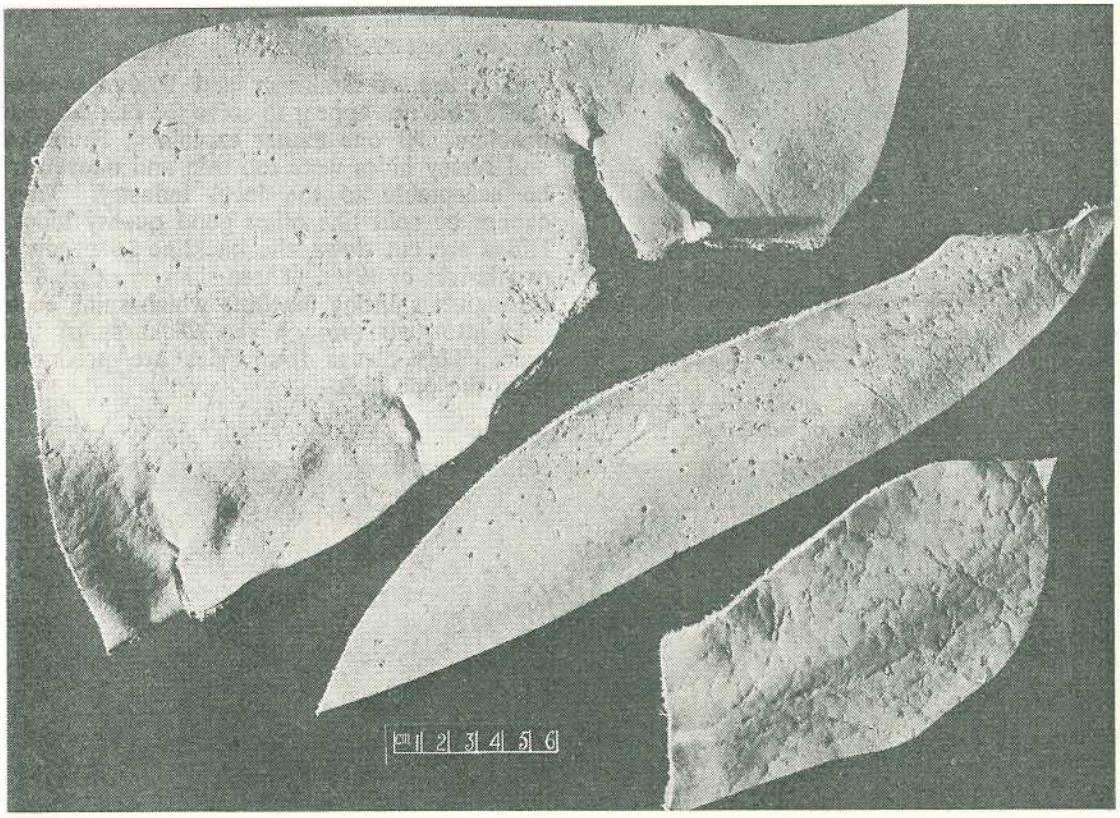
If this is not practicable, dilute the pesticide to spraying strength. Select a disposal pit at least 18 inches deep and spread a bag of lime over the bottom. Pour the diluted pesticide into the pit and allow it to soak in. Then cover with several inches of soil.

Do not take unwanted pesticide to an incinerator.

By courtesty Agricultural and Veterinary Chemicals Association.

Facts on cattle hides

by D. J. Daniel and P. J. McGuiness, Slaughtering and Meat Inspection Branch.



Tick damage on a tanned hide.

FOR over two years now, Slaughtering and Meat Inspection Branch and Beef Cattle Husbandry Branch have been investigating the bruising problem in cattle.

Although it is commonly stated in scientific literature that bruising damages hides, no critical study had been done on this.

Questions arose—would bruising cause downgrading of hides at meatworks and reduced prices in the leather trade? Although prices vary substantially, hides average about 10% of the total value of prime cattle. They are a valuable by-product and the questions posed are serious ones.

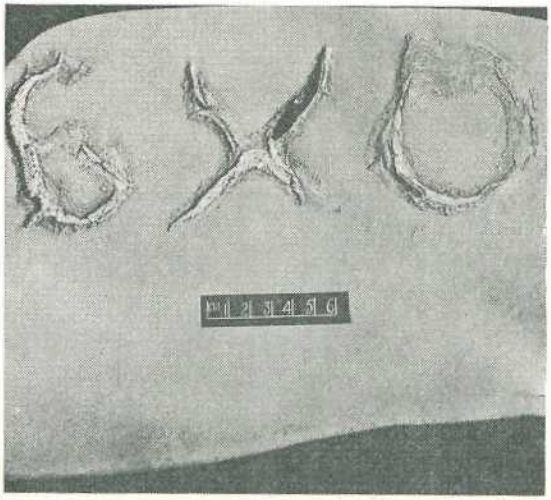
To obtain answers to these questions, around 50 000 hides were examined over a period of six months at a major Brisbane abattoir.

Opinions were sought from experienced personnel in all facets of the industry and visits were made to local tanneries.

It quickly became apparent from inspection and trade comments that bruising was not a major problem but was overshadowed by the enormous damage caused by ticks and brands.

Ticks

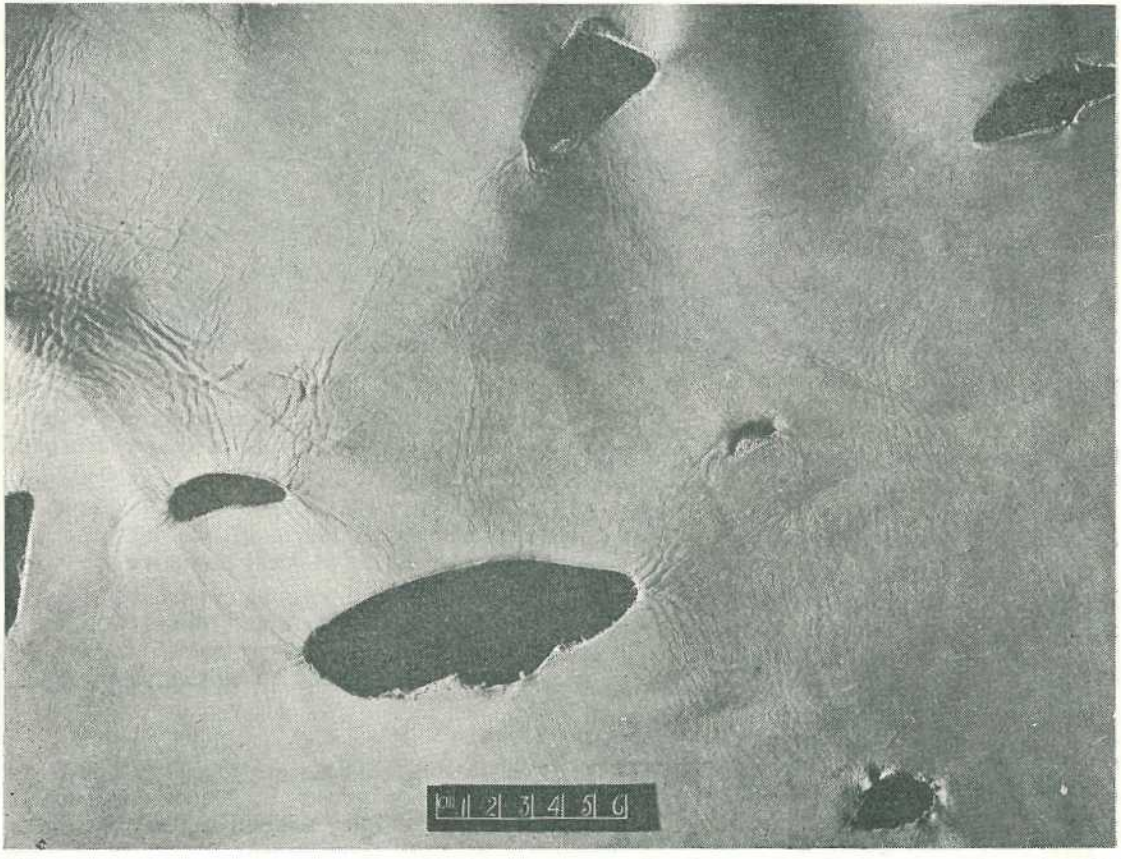
Undoubtedly, ticks are the biggest problem facing the hide industry in Queensland. Tanned, 'ticky' hides display a pitted appearance similar

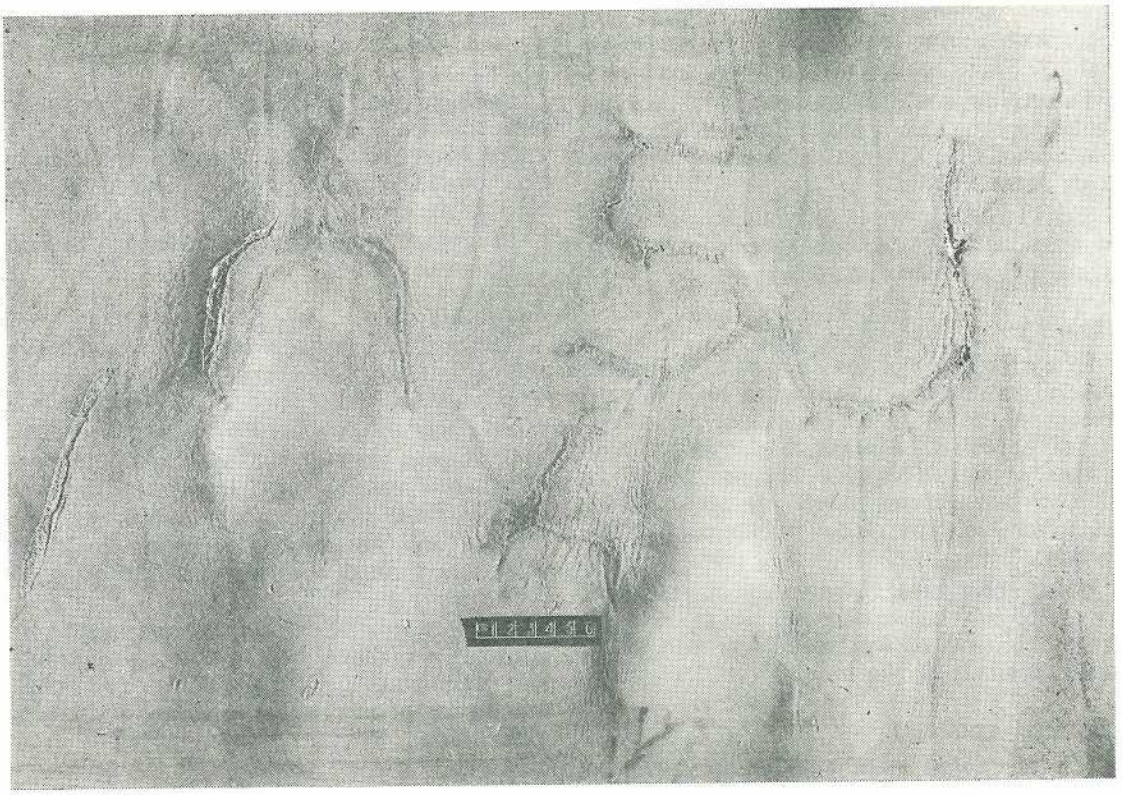


ABOVE. This brand has been applied too heavily. Scar tissue breaks down and this causes holes in the hide.
BELOW. Flay marks on a tanned hide are caused by incorrect use of knives or air knives.

to thousands of tiny pin pricks. This excludes the hide from top quality leather production. Ticky hides are avoided wherever possible by Australian tanners. Although there is an overseas market for them, they are of much less value than undamaged hides. To produce a saleable product, a ticky hide is normally stained, patterned and used in such products as handbags and purses.

The use of Brahman and Brahman-cross cattle does not appear to solve the tick damage problem. As one tanner explained, Brahman and Jersey hides were too thin and uneven to be acceptable to the local industry. They cannot be split like other good quality hides. Hides are cut down the backline to produce two halves or sides. These sides are then fed through a splitting machine which splits each side into two through the thickness of the hide. This means four sides are produced from the one hide.





An oversize rib brand reduces usable area.

Brands

The size and position of brands on hides from Queensland cattle cause many problems for manufacturers. As a result, Queensland producers are losing money.

The area of hide from the backline down over the ribs produces the best leather. Top quality shoes are manufactured from this area. A large rib brand reduces the price of the hide by 25% whereas one on the cheek, neck or butt does not detract from the value.

By regulation in New South Wales, brands are placed in one position only, the butt area near the tail. This makes the whole hide a usable product and is one of the reasons why local tanning operators buy the bulk of their hides from this State.

Cross-branded cattle also receive a reduced price from buyers. To emphasize this, one tannery operator quoted an extreme case of finding 35 brands on one side of a hide. It is not uncommon to find four brands per side.

Incorrectly applied brands are another problem. If instruments are applied too heavily or for too long, the hide tissue breaks down. This makes that area unsuitable for processing.

To a much less extent, flay marks, spay scars, bacterial spoilage and bruising, including horn damage, contribute to downgrading of Queensland hides.

Flaying

This is the removal of the hide from the carcass in the dressing process. Problems occur when score marks made by ordinary knives and air knives penetrate too deeply and damage valuable areas. Quality control staff in most meatworks monitor this process to keep damage to a minimum.

Horn and spay scars

Sharp horns can cause holes and deep scratches. Scar tissue is laid down during the healing process and this has a pronounced

effect on the tanned hide. Holes appear over these areas during the splicing operation in the tannery. This makes downgrading necessary.

Dehorning would be an answer to this particular aspect. This is a sound practice because it is a fact that less muscle bruising is found in de-horned cattle.

Spaying scars, wire and lantana scratches and various other wounds cause similar problems to hide manufacturers.

Bruising

Extensive investigation showed that bruising was only a minor problem when hide value is considered. Removal of bruised, subcutaneous tissue showed no damage to the actual hide surface at all. The hide appears to be an effective buffer zone, muscle damage could be extensive while the hide still remained unbruised.

However, if bruised, subcutaneous tissue is not removed before curing, it provides a favourable medium for bacterial growth which causes spoilage of the hide.

Bacterial spoilage

This is caused mainly by incorrect curing techniques whereby the hide is not completely covered with curing salt. Areas of fat and bruising that are not trimmed lead to spoilage as salt does not effectively penetrate these areas.

Spoilage mainly occurs in summer when temperatures are high. Even hides properly cured have been known to contain spoilage in hot, humid weather. One spoiled hide may lead to the contamination of a whole batch.

In manufacture, areas spoiled by bacteria cause weak leather.

Summary

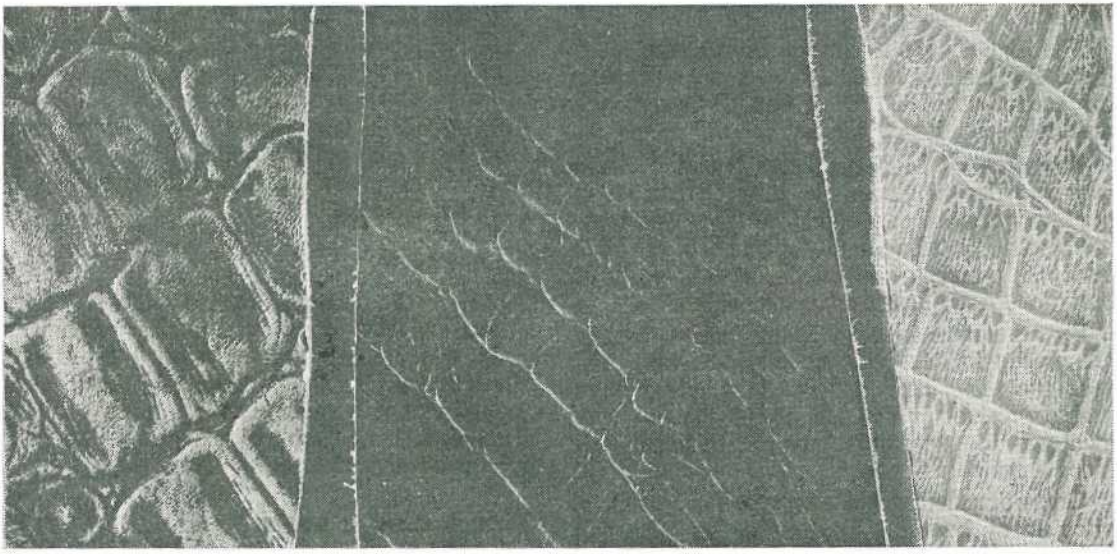
The beef industry as a whole is not achieving the highest possible returns from prime cattle. The problems mentioned in this article can cause losses of around 10% to beef producers.

Producers, meatworks and tannery operators should form a close liaison and become more aware of each other's problems.

Ideas and answers to problems could be passed on through the Department of Primary Industries.

The obvious areas for improvement are adopting a practical but less damaging branding technique, dehorning cattle and close monitoring of meatworks' dressing and curing procedures. Perhaps some incentive from hide manufacturers could foster improvement.

A better deal all round for the Queensland beef industry would be a worthwhile goal.



A market does exist for downgraded hides that have been stained and patterned. Because this is an expensive process for the manufacturer, producers cannot expect full market price for their inferior hides.

Peanut leaf spot and rust control on the Atherton Tableland

by R. G. O'Brien and R. D. Davis, Plant Pathology Branch.

PEANUTS are grown on the Atherton Tableland during the hot, wet months of December to April. These conditions, which are suitable for the rapid growth of peanut plants also favour destructive outbreaks of leaf spot (*Cercosporidium personatum)* and rust *(Puccinia arachidis).*

Field trials conducted since 1973, when rust was first detected in the area, indicate that both diseases can be controlled by fungicidal spraying. Yield increases of up to 50% have been recorded.

The main points to consider in a control programme are discussed below.

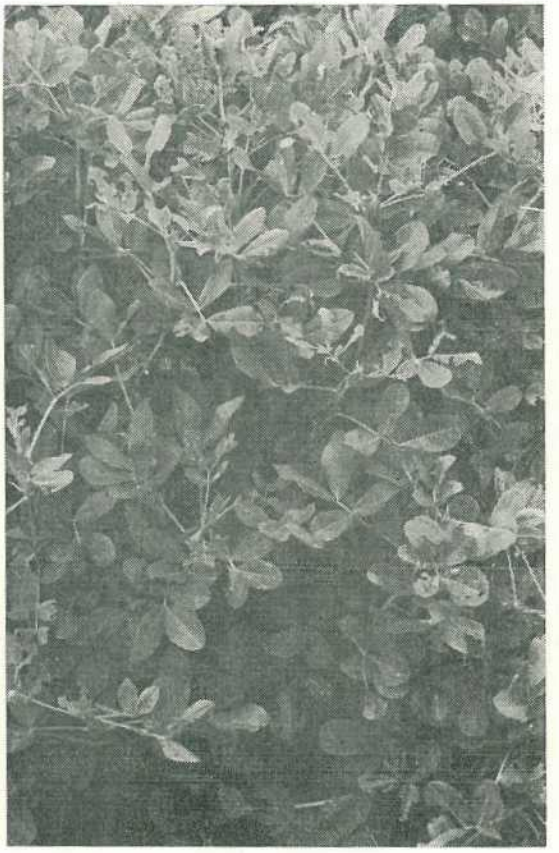
Crop rotation and volunteer plants

The fungi which cause these diseases may survive from one season to the next on volunteer plants and, in the case of the leaf spot organism, on peanut plant debris. The chances of early infection in a crop can be reduced by eradicating volunteer plants during the September to December period and practising crop rotation.

On the Atherton Tableland, alternate cropping with maize is a suitable rotation. Deep ploughing of crop residues will also assist in removing sources of inoculum.

Time of planting

The establishment of crops 6 to 8 weeks earlier than the main district planting should be discouraged since these are potential hazards to the success of a disease control programme in neighbouring crops.



Fungicide application results in a healthy crop.

Choice of fungicide

The fungicides chlorothalonil ('Bravo') and fentin ('Du-Ter') are currently recommended for the control of leaf spot and rust. Neither requires the addition of white oil or wetting agents to be effective. **Oil or wetting agents added to fentin may result in severe burning of the foliage.**

The systemic fungicides benomyl ('Benlate') and carbendazim ('Bavistin') which have been widely used in the past for leaf spot control are not effective against rust. Their efficiency against leaf spot has been reduced by the development of tolerant strains of the leaf spot fungus.

Timing of fungicide applications

Both chlorothalonil and fentin are protectant fungicides and act by killing the leaf spot and rust fungi before they enter the leaf. The objective of the spray programme is to maintain an effective deposit of fungicide on the foliage particularly when conditions favour the build-up of disease.

The first application should be made as soon as either disease is first observed. This is most likely to occur 4 to 6 weeks after planting. If growers are not able to regularly and thoroughly check for the presence of leaf spot and rust, the first spray should be applied no later than 6 weeks after planting. **Do not wait for the diseases to build-up.**

Applications should continue at fortnightly intervals until 4 to 5 weeks before pulling. Trial results have shown that for a high standard of rust control, the interval between applications should be reduced to 7 to 10 days during periods of heavy rainfall or prolonged

An untreated plot showing severe leaf fall in a field trial on the Atherton Tablelands.

showery weather. Five or six applications in each season will usually be required.

Application techniques

When bushes are small, fungicides may be applied by boom spray with overhead nozzles. Later inter-row nozzles on short droppers should be added to the overhead boom. Spray volumes will vary with nozzle number and type, operating pressure and ground speed. Various combinations are acceptable provided thorough leaf coverage is achieved.

As a general guide, pressures in the range of 450 to 700 k Pa and the spray volumes shown in the table will provide this standard of coverage.

For convenience, or when weather conditions prevent the use of ground spray equipment, aerial application may be used. To be effective, aerial application must be made during calm conditions.

In trials, several dosages of fungicides have been tested. During seasons of heavy disease pressure and high rainfall, increasing the dosage of chlorothalonil has given improved control, particularly of rust. With moderate disease pressure and less frequent showers, lower rates have maintained excellent control of both diseases. When disease pressure was high, the improvement in control due to increasing fungicidal dosage was not as great as that obtained by reducing the spray interval. Recommended rates are given in the table.

The key to the successful control of leaf spot and rust is to be prepared to spray at the first sighting of a leaf spot or rust pustule. If in doubt, spray. If the crop has not been sprayed before it is six weeks old, inspect it thoroughly to make sure the diseases are not present.

Editor's note: The Plant Pathology Branch advises that with the occurrence of rust last season in southern Queensland, some changes in spraying schedules may be needed in that area.

The situation will be closely watched during the 1976-77 season and firm recommendations will be made for the 1977-78 season. In the meantime, growers are urged to follow the advice of Departmental officers on spray schedules.

FUNGICIDE RATES AND SPRAY VOLUMES FOR CONTROL OF LEAF SPOT AND RUST

Time after planting	Application Method	Fungicide	Rate/ha	Spray Volume (l/ha)
0–8 weeks	Overhead boom	Bravo Flowable*	1 litre	100–150
		Du-Ter Extra**	400 g	
	Aerial	Bravo Flowable	1·5–2·0 *l*	50–100
		Du-Ter Extra	680 g	
8 weeks	Overhead boom and droppers	Bravo Flowable	1·5–2·0 *l*	250–350
		Du-Ter Extra	680 g	
	Aerial	Bravo Flowable	1·5–2·0 *l*	50–100
		Du-Ter Extra	680 g	

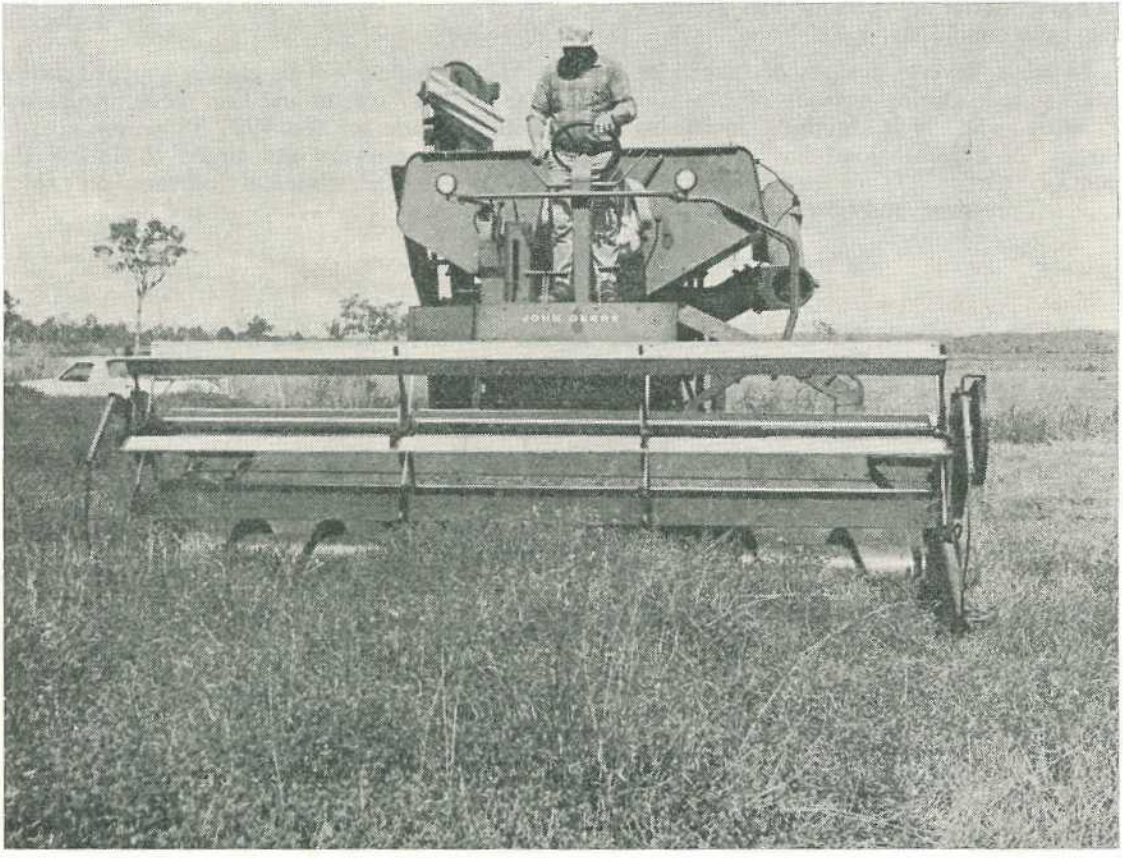
* Bravo Flowable Fungicide contains 720 g/l chlorothalonil.
** Du-Ter Extra contains 453 g/kg fentin as fentin hydroxide.

Seed production of stylo

by J. M. HOPKINSON and D. S. LOCH, Agriculture Branch.

SEED production of stylo (*Stylosanthes guianensis* cultivars Cook, Endeavour and Schofield) in Australia is almost entirely confined to north-eastern Queensland.

The main districts are the coastal strip from Ingham to Silkwood, the lowest level of the Atherton Tableland around Mareeba, and the Endeavour and McIvor River areas north of Cooktown.

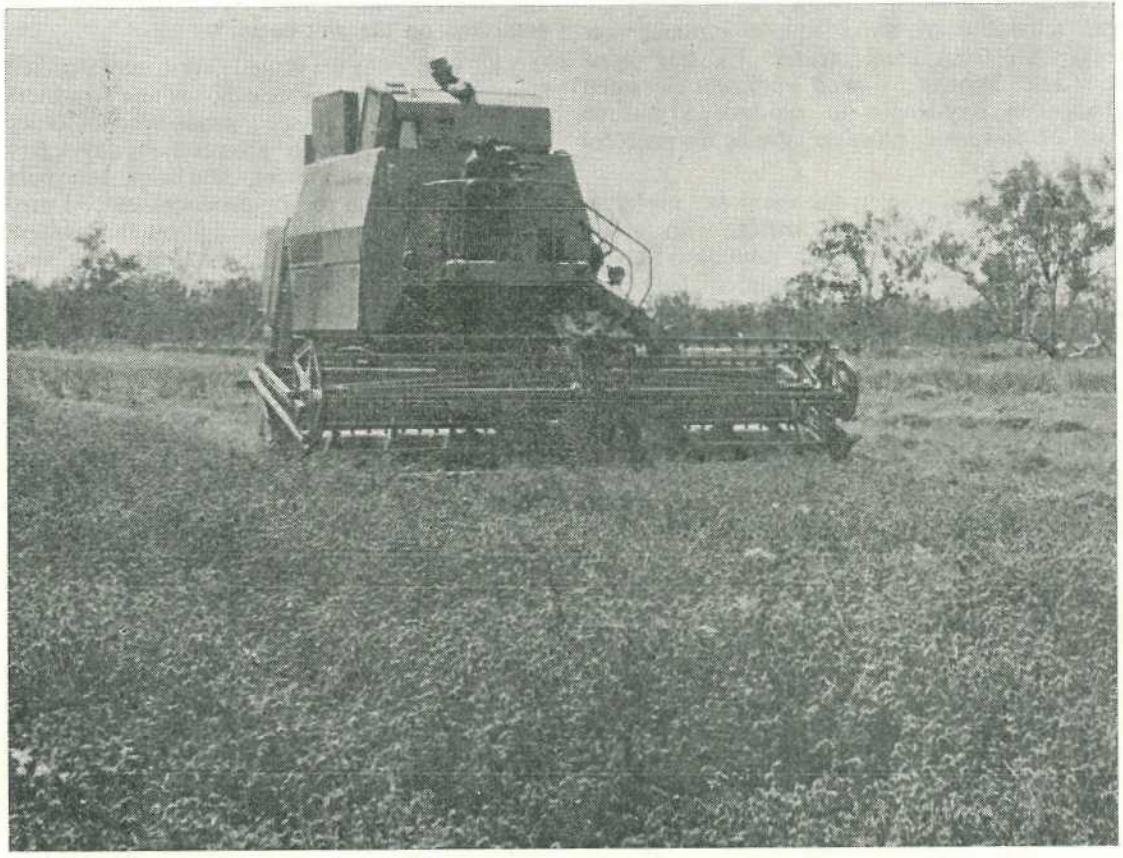


The stylo harvest taxes the skill and concentration of the driver and the robustness of his machine probably more than any other crop.

in north Queensland

History

Large-scale seed production began with the demand arising from the expansion in sown tropical pastures during the mid 1960s. In mixed farming districts, planting for seed was undertaken from the start. However, in the Tully-Cardwell area, land was cleared and sown with stylo primarily for pasture. Seed production soon became so remunerative and so useful in providing an early cash flow, that



A stylo crop may present 20 t per ha of green, sticky, tangled vegetation to the harvester, only about one per cent of the weight of which may finally represent the seed yield.

for several years it took precedence over cattle. During that time, the district produced the bulk of Australia's stylo seed.

Production increased annually until 1973 when roughly 150 tonnes of Schofield and 50 tonnes of each of Cook and Endeavour were harvested. Although internal demand had probably declined before that time, a substantial export market had emerged, particularly in Brazil. In 1974, however, bad weather and disease were accompanied by a collapse of the export market, so that much of the reduced harvest remained unsold. The recession has continued, being aggravated by the present misfortunes of the beef industry.

Climatic and soil preferences

Correct choice of climate is of paramount importance for reliable, heavy seed production. Freedom from frost, absence of winter rain, and reliability of an adequate summer wet season are the critical factors. Existing cultivars also appear to need sufficient seasonal change in day-length to produce a distinct flush of flowering; however, this is no problem in Queensland.

Conditions closest to the ideal are probably those of the Cooktown district, with about 1 500 mm average annual rainfall. This is received mainly during the summer. However, stylo tolerates some divergence from the ideal, and can be grown for seed in conditions too dry for it to thrive in a pasture (Mareeba receives around 900 mm a.a.r.). Seed crops are also grown in the very wet Tully district (3 000 to 4 000 mm), though not without problems; winter rainfall is troublesome, encouraging disease during crop development and knocking ripe seed to the ground.

Stylo performs best in the high year-round temperatures of the lowland districts. It tolerates the cooler Tableland conditions up to about 700 m altitude, though there is some evidence that Endeavour does not give of its best at elevation. Above about 700 m, the likelihood of crop failure is increased by the risk of frost, apparent effects of low temperature on flowering and seed set, and disease risk from overcast winter weather.

Although primarily sown in pastures on less fertile lowland soils, stylo will grow successfully on almost all arable soils of the districts where it is used. It will tolerate a degree of waterlogging and a great measure of water stress.

In the light of these preferences, the scope for further extension of the stylo seed crop in Queensland appears small. Expansion northwards is the chief possibility, as commercial crops at Iron Range have shown.

Position in farming systems

The ability of stylo to colonize freshly-cleared, infertile country has fitted it to the role of a pioneer crop in the early development of a pastoral enterprise. Improvement of soil structure and fertility under stylo lays a foundation for the later establishment of a stable pasture, but it also makes weed control progressively more difficult. It is easier to shift to new ground to continue seed production. The pioneer role of stylo has particularly been exploited on the wet coast.

The seed crop fits equally well into a mixed farming system, especially where farmers already specialize in seed production of other species. Usually, such growers already carry the necessary equipment, and also run beef cattle to consume the by-products. Weed problems are greater in this situation than where new ground is continuously available, but generally the grower is better equipped to combat them.

Crop establishment

Land preparation should take into account the need to control weeds (see Weed control) on all but newly-cleared ground. As with other small-seeded crops, a firm, fine seedbed is desirable. It should be as level as possible to aid subsequent harvester operation.

Opinions differ about whether or not the seed should be covered, and good establishment has been obtained either way. Seed is usually broadcast, but, if possible, row-planting at shallow depth is preferable to give better control over distribution and to permit removal of off-types and cultivation for weed control after establishment. Rows should not be more than 50 cm apart.

Stylo is normally planted as soon as possible after the start of the wet season. Crops established by early January have every chance

of being in full production in the first season, but later establishment usually results in a lower yield from the first harvest.

Establishment is best when wet, overcast weather follows planting and maintains a moist soil surface for a few days. Irrigation or isolated storms are far less effective.

Establishment fertilizer requirements for seed crops are the same as for pastures. Local pasture recommendations should normally be followed.

Recommended sowing rates usually allow for failure of most of the seeds. A normal rate of 3 kg per ha of seed of minimum salable purity and germination would distribute about 40 live seeds per square metre. The successful establishment of perhaps five of these would ensure an adequate population.

Stylo nodulates readily with both native strains of rhizobia in the soil and commercial cowpea inoculant. However, the cautious grower will inoculate, especially where legumes have not previously been sown.

Maintenance of stand

Stylo is a perennial and old plants may be expected to persist for several seasons. There is no apparent loss of vigour with age, and weed control in established crops is far easier than in renovated ones. Occasionally, however, old plants are lost, usually through accidental fire, but sometimes from cutting too low at harvest.

Seedlings always appear after the death of old plants, but success in re-establishment varies, depending on the weather and the level of weed competition. Deliberate renovation (for example, a shallow cultivation and the incorporation of a selective pre-emergent weedkiller such as trifluralin) improves the chance of re-establishment, even though this chemical is reported to depress stylo growth slightly.

In general, the risk of weed infestation in an established crop increases with age (probably from increased soil nitrogen) and tends to limit the useful life of a seed paddock. However, through careful management, some growers have maintained clean crops for longer than ten years. Weed encroachment is not entirely irreversible, a second year crop often suppresses weeds that accompanied slow establishment.

Crop management

The aim of crop management is to produce a clean, level, uniform, well-synchronized seed crop with a minimum of unnecessary plant growth. Established crops and first-year crops sown early make far more growth than is necessary to produce a full seed crop. If left intact, such crops develop a tall, uneven mass of growth that later subsides, forming a heavy, tangled mat which cannot be harvested efficiently. On the other hand, crops planted late or defoliated too late in the season produce open canopies of poorly-synchronized, flowering shoots. This results in low seed yields.

TABLE 1

STYLO SEED CROPS—TIMETABLE OF EXPECTED BEHAVIOUR IN A NORMAL SEASON IN NORTH QUEENSLAND*

Cultivar	Cook	Endeavour	Schofield
Latest safe date for defoliation	Late February	Late February	Early April
First flower formation in bud (invisible to observer)	Late March	Late March	Early May
Light sprinkling of open flowers	Late April	Early May	Early June
Flowering peak	Mid to late June	Late June to early July	Mid-July to mid-August
Seeding peak	Mid-July	Mid-July to early August	Late August to mid-September

* The dates refer to well-grown, established crops. First-year stands established after early January are likely to be delayed in every stage of development.

TABLE 2

WEED CONTROL IN STYLO SEEDCROPS

Occasion	Situation	Herbicide	Rate of Application	Methods of Application
Before planting ..	In old cultivation in anticipation of annual grass infestation	Trifluralin (40% w/v) 'Treflan'	1·5 to 2·0 *l* of product per ha, according to soil type	Spray on to soil surface in at least 90 *l* per ha of water and incorporate immediately into soil with rotary hoe or two passes of tandem discs
Early after establishment (6 to 12 weeks after emergence)	To control seedlings of broad-leaved weeds	2, 4–D (50% w/v amine	1 to 2 *l* per ha of product	Boom spray with 170 to 280 *l* per ha of water, or aerial spray with 60 *l* per ha of water. Add 50 or 60% w/v non-ionic wetting agent (such as 'Agral 60') at 1 *l* per 500 *l* of water
On an established crop during active weed growth	To control established plants and seedlings of broad-leaved weeds	Various formulations available	Up to 3 *l* per ha of product	
On an established crop after emergence of weed seedlings	To control seedling regeneration of weeds	Paraquat (20% w/v cation) 'Gramoxone'	0·75 to 1·5 *l* per ha of product	Boom spray with 340 *l* per ha of water

Potentially the most productive crop is one that has achieved full ground cover early in the season and has then been kept in check by strategic cutting. Seed paddocks are sometimes stocked until early in the wet season, but once locked-up they should not be grazed again. Subsequent defoliation should be carried out mechanically; slashers are commonly used, although headers have also levelled developing crops very effectively.

It is not possible to make rules about the height at which to cut except that anything approaching total defoliation should be avoided.

The most effective defoliation in producing a level crop is the latest possible one that still allows full recovery of the crop canopy before the first flower buds are formed. The latest safe date varies with the flowering time of the cultivar in question. The dates applying to north Queensland are given in Table 1, assuming one month as the time necessary for full recovery. However, common sense should be used in applying these recommendations in practice, because the actual recovery time will vary with both the severity of defoliation and weather conditions.

In a long season of vigorous growth, several defoliations are probably better than one. The expected return, however, limits the number of operations that can be performed. Moreover, paddocks may frequently be inaccessible to tractors. Wet weather commonly interferes with growers' intentions.

The removal of trash, after either harvest or slashing, is desirable because of its tendency to suppress new growth, but it is not always feasible. From this point of view, grazing has an obvious advantage. The header windrows are baled for hay when circumstances warrant it, although such hay is of low quality.

Weed control

Weeds are a constant threat to stylo crops. Weed competition is often severe at establishment and renovation, and seed contamination is a major source of loss during cleaning.

Fortunately, there are several avenues of attack, and details of the more common control measures are listed in table 2. First, the use of a suitable pre-emergent weedicide (for example, trifluralin) to control annual grasses at planting is advisable on all but new ground. Second, stylo has a good tolerance of 2, 4–D from about 6 weeks of age. Third, a desiccant will kill weed seedlings in an established crop. Finally, strategic slashing usually gives stylo a competitive advantage over weeds.

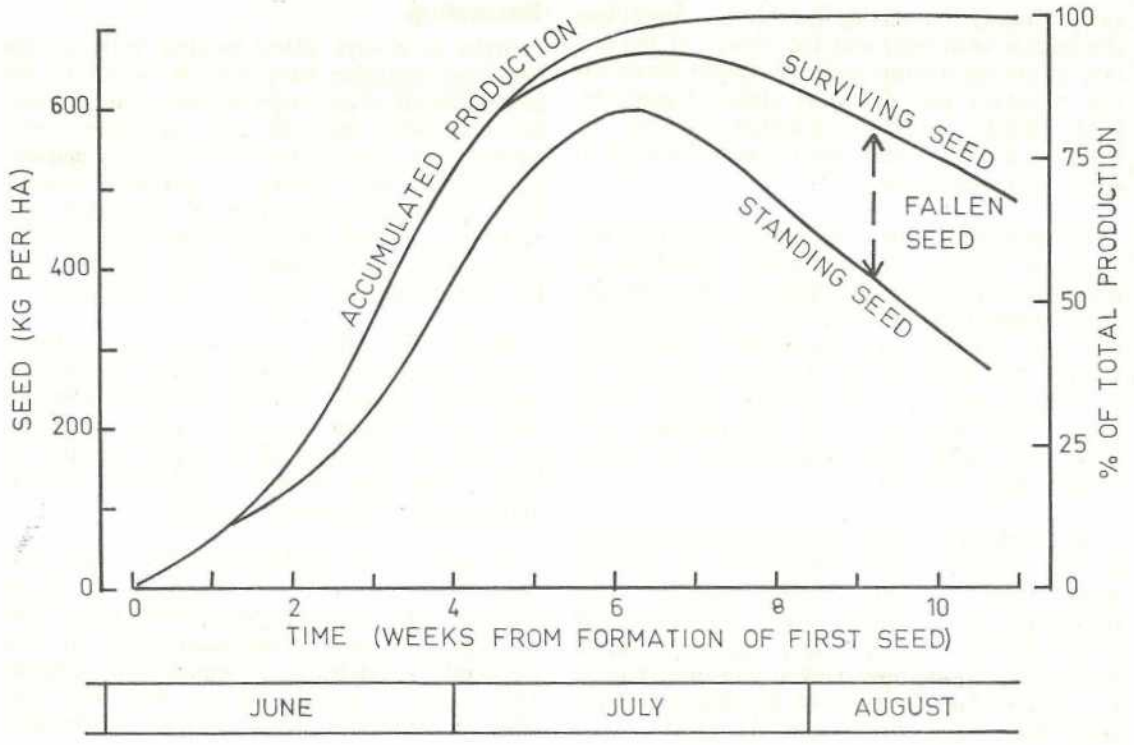


FIGURE 1

PATTERN OF PRODUCTION, RETENTION AND LOSS OF SEED IN STYLO

The diagram is based closely on actual records obtained in a heavy crop of Cook stylo at Walkamin in 1971. Commercial harvests of similar crops have yielded absolute maxima of about 350 kg per ha of seed. This illustrates the great discrepancy between production and recovery.

The difference between 'accumulated production' and 'surviving seed' represents losses due to various factors such as deterioration, germination, bird damage etc.

Although the weed species vary from one district to another, the commonest and most troublesome are dark blue snake-weed (*Stachytarphaeta urticifolia*) pale blue snake-weed (*S. jamaicensis*), chaff-weed (*Achyranthes aspera*), and species of *Sida*. Because of their seed size, these weeds are difficult to clean out of stylo seed. Consequently, they add to the cost of cleaning, and are likely to be introduced to clean paddocks via seed or harvesting machinery.

There are nine different types of *Sida* found in crops in north Queensland, each has unique seed characteristics. Seeds occur both naked and with a husk, and for every grade of stylo seed being cleaned there is one or more form of *Sida* seed to cause trouble. Fortunately, most species are susceptible to 2, 4-D as young plants, and can be controlled. Spiny-head sida (*S. acuta*), however, is virtually immune to 2, 4-D and can only be controlled by vigorous competitive growth of stylo.

Choice of harvest time

Stylo retains a high proportion of its total seed production on the standing crop for a reasonably long time (see Figure 1), so that, from the point of view of obtaining the peak of standing seed, judgement is not too critical. Unfortunately, other factors must be taken into account. The first is stickiness, which

causes many harvesting problems. Stickiness diminishes with age, and the choice of harvest time is always a compromise between diminishing stickiness and declining yield. If possible, cool, damp, overcast weather should be avoided, as far better results are obtained in clear, dry conditions.

Flowering of stylo is believed to be triggered by short day-length, and, unless something is done to delay crop development (for example, late slashing), the harvest time of each cultivar in each district is reasonably predictable (Table 1). Schofield is the most variable in its time of ripening. For example, in the Tully district, the harvest in the exceptionally dry winter of 1972 took place about six weeks earlier than normal.

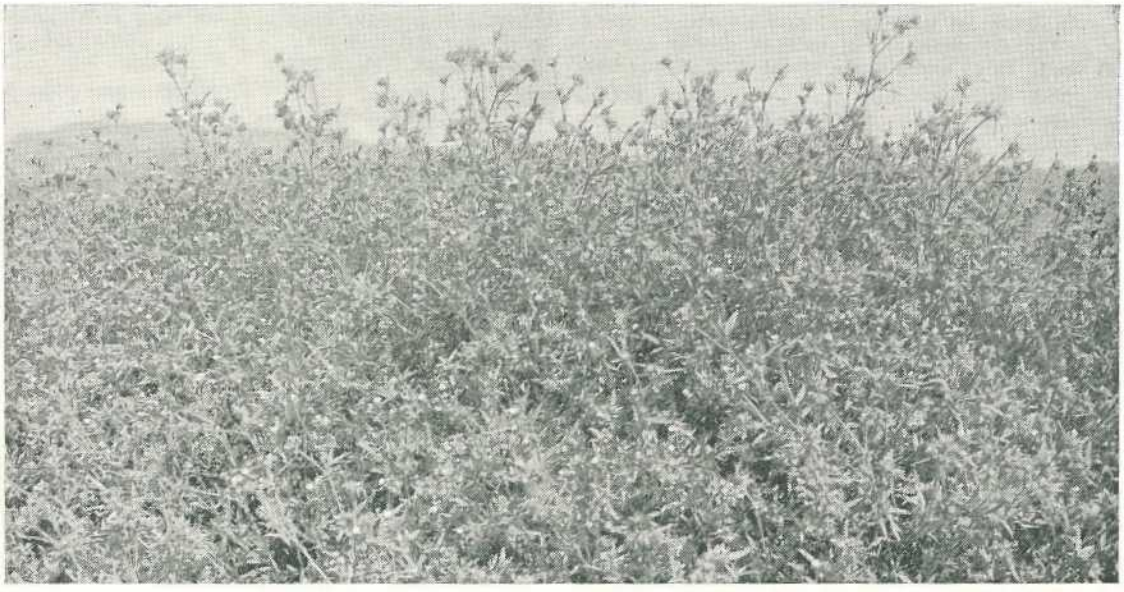
Recognition of ripeness from the appearance of the crop requires experience. In general, some seed shedding should already have occurred (see Figure 1); there should be few visible flowers or green seeds; ripe seed should be obvious, protruding from the heads; and the patter of its fall should be clearly audible when the crop is struck with the hand.

Harvesting

Stylo is always direct-headed with a conventional combine harvester. It is one of the most difficult of all crops to harvest in this way, but alternative methods and variations (prior windrowing, desiccation with diquat, suction harvesting) have shown no promise whatsoever. Difficulties arise through the great bulk of tough, tangled, sticky vegetation in relation to the low yield of small seed, and the need for hard threshing to extract all ripe seed.

Much trial, error, and experience is necessary for optimum harvester setting. The header can be overloaded at every point of its operation, so that steps are usually taken to reduce the rate of through-put of plant material. A level, even crop allows a minimum of leaf and stem to be passed through.

Growers often modify their harvesters, cutting down the width of the front, or fitting them for reduced minimum ground speed; even so they frequently do not take a full cut. The reel may be raised, as it serves little purpose. The drum is usually of the rasp bar type (though peg-tooth drums appear to function



Stylo seed-heads are borne in sticky clusters at or near the usually undulating surface of the crop.

Failure to check summer growth results in a tangle of superfluous vegetation.

equally well) and spins at a high rate (1 000 r.p.m. or over) with a narrow concave clearance. A low rate of flow of air over the sieves is necessary.

Only a limited part of the day is suitable for harvesting; before 11 a.m. and after 4 p.m. conditions are usually too humid in all districts.

Constant adjustment of cutting height is necessary during harvesting, even in a uniform crop. The seed is mostly carried in the upper layers of the crop canopy (in about the top 30 cm), but the surface itself is seldom very level. Blockage and wrap are frequent, as sprawling branches of poorly managed crops often exceed 4 m in length and may be drawn into the header from a great distance.

Gum builds up on all parts of the machine that come into contact with plant parts, and its removal is necessary after prolonged operation. From time to time the cutter bar should be washed with either turpentine or water.

Seed drying

The harvested seed can be dried in all-purpose seed dryers or on tarpaulins in the sun. Both bin dryers (with forced draught through stationary seed) and drum tumbler dryers are used. The maximum temperature normally recommended is 35°C and this is certainly safe, but the use of higher temperatures has never been critically tested.

Growers using the highly efficient tumbler dryers should watch out for seed that is apparently more dry than it actually is. Sometimes the surface layers of the seed and accompanying trash seem dry when the centre of the seed is still moist. The seed then appears to regain moisture during storage as the inner moisture penetrates the outer layers. Seed will deteriorate if it is not re-dried.

Seed cleaning

The removal of inert matter in the form of fragments of the parent plant is easily achieved by simple winnowing and screening methods. There is no need to remove the flimsy pod as mixtures of seed with and without the pod are quite acceptable to the trade.

The removal of weed seeds, on the other hand, is often difficult, time-consuming, and wasteful. It requires the specialized equipment of the commercial cleaning plants, and is not a job to be done on the farm.

Experienced growers have developed a number of tricks that facilitate subsequent cleaning. Some, for example, have found that *Sida* seed separates from stylo with the motion of drum tumbler dryers, and much of it may be emptied from one end before removal of the seed bulk. Others have taken advantage of the fact that some *Sida* fruits remain intact during harvesting, only fragmenting into their separate seeds on drying, and have pre-cleaned their seed before it was dried.

The choice of screen perforation sizes for cleaning depends on the characteristics of the cleaner to be used. A starting point in the choice of screens is a knowledge of the upper and lower limits of passage of seed (that is, the smallest perforation that will allow all, and the biggest that will allow no useful, seed to pass through). The following range of limits applies:

	Round hole (diameter in mm)	Slotted hole (width in mm)
Upper limit ..	1·7–2·4	1·2–1·5
Lower limit ..	1·4–1·7	0·8–1·1

It is necessary to state a range of limits because seed size varies between batches, between cultivars (Schofield, Endeavour and Cook have about 370, 440 and 470 seeds per g respectively), and according to the presence or absence of the pod.

Pests

Provision against insect attack is unnecessary. Although caterpillars are frequently seen eating flowers and seed-heads, they cause very little damage. They seldom develop beyond the early stages of growth, and it is generally believed that they die from starvation. Root-feeding weevil larvae (*Leptopius* sp.) have been recorded as damaging stylo, but only in exceptional circumstances where stylo has been sown in severely infested paddocks.

Diseases

Two fungus diseases cause very great damage to stylo seed crops. One is head blight caused by *Botrytis cinerea.* This is a universal organism which is capable of growing harmlessly on dead plant tissue but can function as a pathogen when damp, overcast weather coincides with flowering. The entire surface of the crop canopy may eventually be killed in a severe attack. Abortion of flowers occurs, even before death of the seed-head, and massive yield reductions may result.

The second serious disease is anthracnose, caused by *Colletotrichum gloeosporioides,* which appeared as a serious disease of stylo in Australia in 1973. A few years earlier, it had become a major problem in tropical South America.

The fungus can attack stylo at any time from the start of the wet season to the onset of dry weather (roughly December to July in North Queensland), and infects stem, leaf, and seed-head indiscriminately. Lesions on seed-heads appear last and are distinguished from those of *Botrytis* by their characteristic black edge. Mixed infections commonly occur, *Botrytis* presumably moving in on tissues killed by anthracnose.

A general loss of vigour, lack of stickiness, and failure of seed set follow a severe attack of anthracnose. Most damage is generally attributed to the impaired efficiency of conducting tissues caused by stem lesions. There is no known economically feasible control.

The best way to combat both diseases is to grow the crop in districts of low susceptibility. Crops at Cooktown and Mareeba have so far suffered far less from these diseases than have those on the wet coastal strip. Attempts to produce stylo seed on the higher Tablelands (above about 700 m) have almost always been thwarted by *Botrytis,* owing to a very high incidence of drizzle during flowering.

Further details of the diseases of Stylosanthes in Queensland are given in an article by R. G. O'Brien and W. Pont (page 126).

Yields

Average yields are impossible to state, and would have little meaning even if they were calculable. Reliable records of maximum commercial yields of about 350 kg per ha of salable seed exist for all three cultivars. At the other extreme, crops frequently carry too little seed to warrant the expense of harvesting. Yields of around 100 kg per ha are considered reasonable and 200 kg per ha satisfactory.

Although a good crop may carry a maximum of about 600 kg per ha of pure seed at its peak, the efficiency of mechanical harvest is seldom high. Moreover, a crop is often patchy and cannot always be harvested in good weather. Nor can the entire crop be harvested at peak ripeness unless the header has little work to do. Finally, much seed is frequently sacrificed for the removal of weed seeds during cleaning. Collectively, these factors explain the discrepancy between potential and actual yield.

The chief causes of catastrophic yield reduction are disease, rain at harvest ripeness, and weed seed contamination.

Standards for sale of seeds

The Queensland Agricultural Standards Regulations require that seed should meet certain minimum standards to be salable. All cultivars of stylo are required to have a minimum pure seed content of 90·0% by weight, and a minimum percentage of germinable seeds of 40% by number of the pure.

A weed seed content up to 0·5% of the total weight is allowed, provided the weed seeds are not of species on the prohibited list. Copies of this list are available from local Agriculture Branch officers.

Prospects for future production

An increase in internal demand for stylo seed will only follow recovery of the beef industry. Even then, demand may never again reach the scale of the late 1960s. Neither is the Latin American market likely to reach its former size, as the popularity of existing cultivars has diminished through disease problems.

Outlets in South-east Asia are anticipated, but on the whole, demand and production are expected to remain far below the 1973 peak in the foreseeable future.

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600 ml milk bottle

Why has the Metric Board allowed the adoption of the 600 ml milk bottle to replace the pint bottle? Surely 500 ml (half a litre) would have been a more sensible size.

The MCB has no mandatory powers to determine the volumes in which commodities should be packed. This is the prerogative of the State and Territorial weights and measures legislation and comes within a uniform packaging code adopted by all States. The code comes from the recommendations of the Standing Committee on Packaging (SCP), a body which includes representatives of weights and measures authorities from all States.

Initially at the Board's request the SCP examined and indeed proposed 500 ml and 1 000 ml bottle and carton sizes for milk. However, submissions received directly by the SCP made it clear that the 500 ml bottle would not be acceptable in the States because of the potential loss of sales and, importantly, because of the decreased efficiency resulting from the use of a smaller bottle.

Accordingly, 600 ml (but not 1 200 ml) containers were provided in the legislation of the States on SCP recommendation. This also has certain technical advantages for filling containers in 200 ml (for school milk), 300 ml, 600 ml and 1 000 ml quantities from the one four-headed turret of a filling machine without changing the delivery jets (i.e. by having each turret containing 2 x 200 and 2 x 300 ml jets).

The Board's inquiries overseas, together with present trends within Australia, lead to the conclusion that, as home deliveries inevitably diminish or cease to be daily, the swing will be from smaller to larger containers. Already in Canada less than 2% of the milk supply is in pint or half pint containers. So it is probably fair to say that the 600 ml decision (with which the Board agreed) will be increasingly less significant as time goes on.

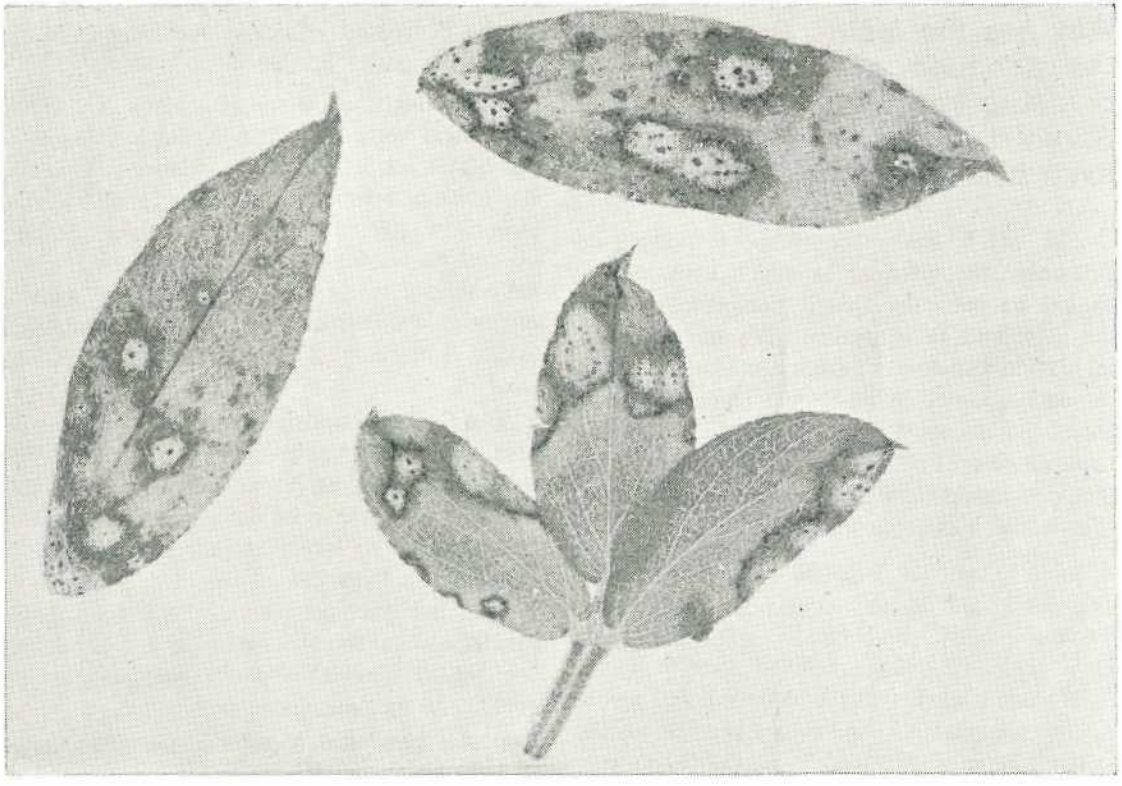
Reprinted from MCB Newsletter, the official organ of The Metric Conversion Board.

Diseases of Stylosanthes in Queensland

by R. G. O'Brien and W. Pont, Plant Pathology Branch.

TOWNSVILLE stylo *(Stylosanthes humilis* cvs. Paterson, Lawson and Gordon), stylo (*S. guianensis* cvs. Schofield, Endeavour and Cook), fine stem stylo *(S. guianensis* cv. Oxley), Caribbean stylo *(S. hamata* cv. Verano) and bushy stylo *(S. scabra* cv. Seca) are gaining favour with farmers as pasture legumes in tropical areas of Queensland both near the coast and in the drier inland areas.

Plate 1. Anthracnose lesions on leaves of *Stylosanthes viscosa.*



Seed production is undertaken by specialist growers on the Atherton Tableland and in the coastal areas near Cardwell and Mackay. While diseases are not numerous at the present time, anthracnose, Botrytis head blight and Rhizoctonia web blight often cause very severe yield losses, particularly in seed crops.

Anthracnose *(Colletotrichum gloeosporioides)*

Anthracnose was first recorded in Queensland in 1973 on *Stylosanthes fruticosa* at Kalinga on the Cape York Peninsula. Since 1973, it has become widespread in tropical Queensland. It is particularly serious in seed crops and pastures of Townsville stylo and Caribbean stylo.

Symptoms of the disease on the leaflets and flowers include lesions 1 to 2 mm in diameter with a grey centre studded with pin-point sized fruiting bodies of the fungus and surround by a dark margin (Plate 1). Yellowing and abscission of severely affected leaves occurs. Lesions on the stems are elliptical, 2 to 4 mm in length and similar in colour to leaf lesions (Plate 2). On susceptible lines, stem lesions may coalesce. This results in death of the stem.

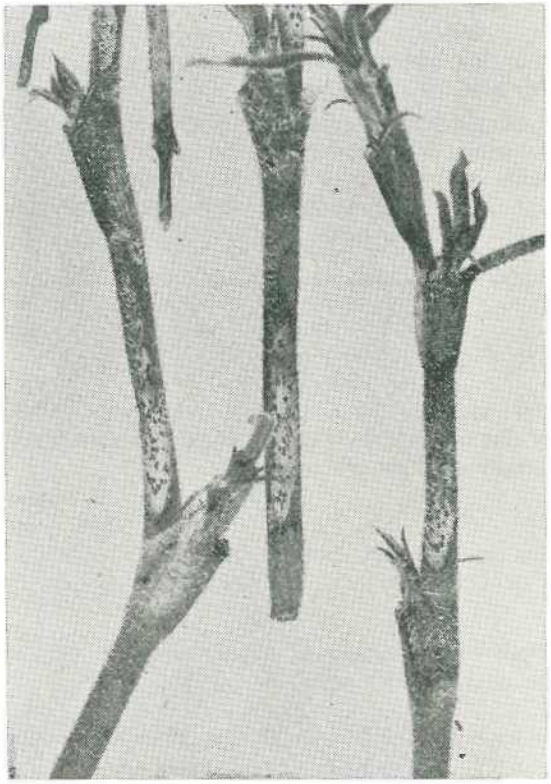


Plate 2. Anthracnose lesions on stems of *Stylosanthes viscosa.*

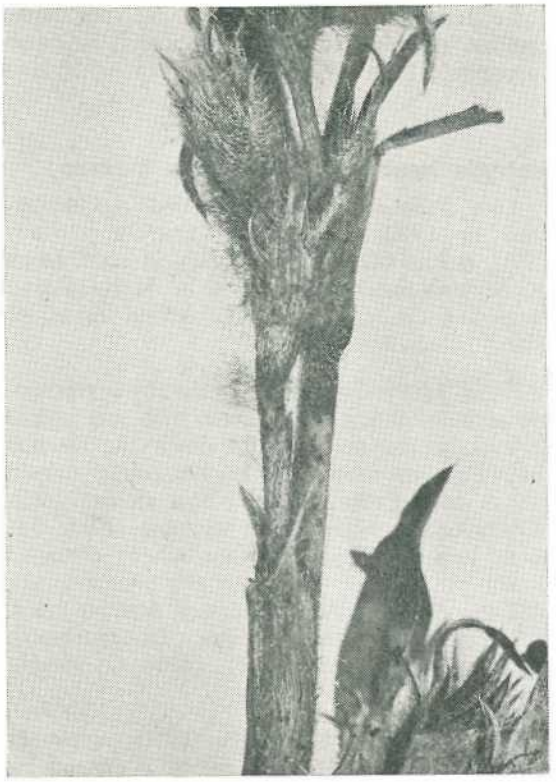


Plate 3. Botrytis head blight on *Stylosanthes guianensis.*

Spores produced in the black fruiting structures are spread in water splashed from plant to plant. Anthracnose transmitted in the seed or in infested trash with the seed may be responsible for early infections.

As disease development is favoured by rain and high humidity, anthracnose is most serious during the summer–autumn wet season. Leaf lesions are not common in winter and spring but the fungus persists in stem and flower lesions.

Cultivars of Townsville stylo are more susceptible than Caribbean stylo which is more susceptible than stylo cultivars.

Botrytis head blight *(Botrytis cinerea)*

This disease was first recorded in Queensland in 1964 on Townsville stylo. Since 1970, it has caused yield losses in seed crops of *Stylosanthes* spp. grown in high rainfall areas on the coast and Tableland areas of North Queensland.

Head blight is characterized by extensive blossom blighting associated with an apical dieback which may extend down the laterals for 45 cm or more. A grey-coloured mould covers the affected flowers and stems, particularly during wet, humid weather (Plate 3). Stem lesions, which develop where diseased flower parts lodge on other plant tissues, are buff in colour and lack the well defined black margin of anthracnose lesions. In contrast to anthracnose lesions, they always remain superficial.

Wet conditions encourage the development of the head blight fungus which is spread by spores produced on the mouldy tissue.

All presently grown *Stylosanthes* species are susceptible.

Rhizoctonia web blight *(Rhizoctonia* sp.)

This leaf blight has caused severe damage to siratro (*Macroptilium atropurpureum*) and Tinaroo glycine (*Glycine wightii*) in North Queensland. It was first recorded on Schofield stylo in 1973 and recurs to some extent every year but its effect on this legume is not as severe as on Townsville stylo and Caribbean stylo.

Web blight is first marked by the death of extensive areas of foliage on the stand. On closer examination, the dead leaves and petioles will be found to be covered and in some cases matted together with a cobweb-like growth of brown fungal hyphae.

It is presumed that the fungus is spread from old, rotting plant material during wet weather.

Control

Anthracnose, head blight and web blight cause most loss in *Stylosanthes* crops grown in wet regions on the coast or Tablelands. An obvious method of control is to avoid planting species of *Stylosanthes* particularly for seed in such areas.

Resistance to anthracnose has been detected in some *Stylosanthes* species. This resistance will be utilized in breeding programmes in the hope that anthracnose-resistant cultivars will eventually be available.

DO not burn containers which have held weedkillers such as 2,4–D and its derivatives. When these herbicides volatize, the resulting vapour may damage nearby plants, crops and shrubbery. Also, herbicides or defoliants containing chlorates may explode when heated.

Dispose of these containers in this manner:

- Break glass containers and chop holes in the top, bottom and sides of metal containers so they cannot be re-used or collect water. A sharpened pickaxe is best for this purpose.
- Bury all weedkiller containers to a depth of 18 inches at a safe disposal site or take them to a dump where they will be covered with soil.

By courtesy Agricultural and Veterinary Chemicals Association.

Brucellosis accreditation for stud cattle

by I. D. Wells, Veterinary Services Branch.

WITH the prospect of test and slaughter facing all cattlemen within the next few years, keen managers are realizing how important it is to avoid purchasing infected replacements.

The National Brucellosis Eradication Campaign has now entered the compulsory test and slaughter phase in the Queensland Eradication Area. This eradication area is at present confined to sixteen Shires in the Townsville and Cairns districts, but will be progressively expanded. Most testing throughout the state will be completed by 1983-84. Queensland should then be declared 'provisionally free' from brucellosis.

It is widely recognized that single blood tests for brucellosis are not completely reliable because of the long incubation period that sometimes occurs with this disease.

For this reason, it is best to buy from a known clear herd. The Brucellosis Accredited Free Herd Scheme has been introduced to provide the industry with a 'bank' of known free herds from which to draw replacements. The Scheme has now been operating for some twelve months.

Most country show societies are now revising their entry requirements for their 1977 shows, so that they will be compatible with the Scheme.

Aim of the Scheme

Because the eradication of brucellosis from Queensland is taking place progressively on an area basis, compulsory eradication by test and slaughter (with compensation for reactors), is limited to declared eradication areas. The Herd Accreditation Scheme provides the stud industry with the means to clean-up brucellosis voluntarily, with the benefits of compensation, in areas not yet undergoing general eradication.

Accredited free studs will be in a position to supply good quality brucellosis-free replacements during the test and slaughter campaign. A significant, additional benefit is that animals from accredited herds are eligible for movement to approved shows and sales without further testing, and into the existing eradication areas in Queensland and interstate without restriction in contrast to cattle from other herds.

Eligibility

The scheme only applies to stud herds. However, where stud cattle and commercial cattle in the same ownership use common facilities (particularly if the herds are run together), they may be regarded as a unit. All breeders from 20 months of age upwards require testing, and all reactors are compensatable.

Requirements

The aim of the various requirements listed in the agreement is to prevent infection gaining access to the herd once testing has commenced.

An up-to-date inventory of animals must be kept, and all animals must be permanently identified. Although tattoos, firebrands or photographs as required by breed societies are acceptable, eartags are much more convenient. These are supplied by the Department free of cost.

Important preliminaries to accreditation testing include an examination by the Divisional Veterinary Officer of the layout of the property. Special attention is given to management practices and to fences, drainage, watering points, dips and yards. A preliminary survey test is also done to establish the level of infection within the herd. If any aspects of this assessment are unsatisfactory, the Department may decline to enter into a programme.

Once testing for accreditation has begun, breeders can only be introduced after approval has been given by the Divisional Veterinary Officer. No tests are required on steers or on cattle moving directly from another accredited free herd, or via an approval sale or show. All other cattle require two CF tests prior to introduction to the herd. In general, owners are encouraged to buy cattle only from other accredited herds.

The control of introductions has important implications. Cattle cannot be returned directly to the herd from shows and sales where there has been any possibility of direct or indirect contact with untested cattle. They must be tested twice in isolation before re-introduction to the property.

This means that cattle can only return freely from shows and sales which are in effect accredited free. The entry of breeding cattle is restricted to cattle from accredited herds or to cattle which have passed two clean tests (60 to 90 days), the second within 30 days prior to entry to the showground. The revised entry requirements for the R.N.A. Exhibition qualify it for this classification, and the majority of Queensland country shows are now following suit.

Sales pose greater problems, as most saleyards are used by cattle of all descriptions. Certain saleyards such as Gracemere have areas which can be cleaned and set aside for the segregation of accredited cattle—again approval by the Divisional Veterinary Officer is required.

Testing

All breeding cattle 20 months of age or more must be tested.

In herds with no reactors to the survey test, **two** clean tests are required at an interval of six to twelve months. If the inventory was complete and the animals were individually identified at the survey test, it could qualify as the first accreditation test. Thus accreditation is possible after six months.

Herds showing reactors to the survey test, but in which an accreditation programme is approved, are in effect involved in eradication testing until the first clean test is obtained. Intervals for eradication testing are 30 to 60 days in intensive herds and 60 to 120 days in extensive herds. A total of **three** consecutive clear tests is required over a period of not less than twelve months. After the first clear test, it is advisable to schedule a confirmatory repeat test quickly, and the third test is done after an interval of six months.

A maintenance test is required every two years in all accredited herds. However, the first maintenance test must be completed twelve months after the accreditation of herds which were found infected at the initial survey test.

Horses in infected herds in this scheme will also be tested. Brucellosis in horses causes abortions, bursitis and joint conditions. There is a real possibility of an exchange of brucellosis between infected horses and cattle.

All survey testing is normally done by Departmental officers, as part of the preliminary assessment or of an area survey. Subsequent rounds of pre-accreditation and maintenance testing may, at the discretion of the Divisional Veterinary Officer, be carried out by practitioners at Departmental expense. Introductions are tested at the expense of the owner.

Compensation

Reactors to testing in approved accreditation schemes attract compensation. The current rates based on residual value, are:

Bulls and dairy cows	$120.00
Beef cows	60.00
Weaner females	30.00
Horses	25.00

While difficulties in having brucellosis reactors treated at meatworks continue, reactors will be destroyed on the property.

Right of withdrawal

An agreement is signed between the Department and the owner when approval is given for testing towards accreditation to commence. Either party may withdraw from the agreement at any time.

Further information

Details of the scheme and agreement application forms are available from all Stock Inspectors and Veterinary Officers of the Department of Primary Industries, and at local offices throughout Queensland.

Banana leaf spot and speckle control

by R. Grattidge, Plant Pathology Branch.

LEAF spot and speckle which are caused by the fungi *Mycosphaerella musicola* and *M. musae* are the most serious leaf diseases of bananas in Queensland and commonly occur together.

They hasten the death of the leaves from the base of the plant upwards. This results in smaller bunches and poorly filled fruit. Consequent exposure of bunches to the sun leads to premature ripening in the field and in transit to market.

Symptoms

The first symptoms of leaf spot are small, narrow, yellowish streaks about 3 mm long on the third or fourth youngest leaf of vigorous plants. These develop into oval, dark-brown spots about 10 mm long with sunken centres and later into spots with light-coloured centres and black or brown margins.

Heavy infection causes rapid death of the leaf tissue which becomes brown in colour with grey and black streaks.

Speckle is first seen as a smoky discolouration of the lower surface of the leaf followed by a general yellowing of affected areas leading to the characteristic dark-brown or black speckling. The period needed for symptoms of speckle to become obvious is longer than for leaf spot.

Spread

Leaf spot and speckle are spread by spores produced on affected leaves and carried by wind between stools and plantations.

Spores germinate in films of moisture on the leaves which the fungus then enters usually from the lower surface. Some weeks elapse before symptoms are seen.

The leaf spot fungus produces two types of spores—conidia and ascospores. Conidia form on the surface of the spots and are spread in water droplets which run from the leaves of parent plants to those of the suckers or are blown by wind to other plants.

Ascospores form in late winter and early spring in small, flask-shaped structures embedded in the tissues of the mature spots. They are forcibly ejected into the air and carried long distances by wind.

The fungus causing speckle produces ascospores in dead or dying leaves and does not produce conidia.

A leaf may be infected with leaf spot or speckle as soon as it begins to emerge from the throat of the plant.

Control

Control is based on regular spraying, eradication of neglected stools and destruction of pseudostems as soon as practicable after their bunches have been harvested.

Fungicides

A large number of fungicides has been tested in north Queensland since 1968. The results have shown that the dithiocarbamate fungicides mancozeb ('Dithane M-45', 'Manzate 200'), maneb and propineb ('Antracol') used with miscible oil will give good control.

Application

Bananas are grown on land which ranges from relatively flat areas in north Queensland to steep hillsides in the south of the State and this influences the type of spraying equipment used.

Most plantations in north Queensland are sprayed with large tractor-drawn air blast machines which deliver 200 to 600 litres per hectare. In southern Queensland, back-mounted misting machines delivering 50 to 100 litres per hectare are most common.

Both methods give satisfactory disease control provided the recommended rates of fungicide and oil per hectare are maintained and only the volume of water varied. Special misting oils may be used in misting machines instead of miscible oils.

In north Queensland, growers should spray at least every three weeks for most of the year. The standard of control has been improved by reducing the interval between sprays in the wet season between late January and the end of March to two weeks and increasing it to 4 to 5 weeks in the drier months.

Leaf spot and speckle are more difficult to control if they have become well established. Spraying in late winter and early spring will prevent early build-up of inoculum.

In south Queensland, December to March is the critical period for disease development and a three weekly spray schedule should be maintained at least during this time.

It is important, especially in the control of speckle, to ensure that leaves which have emerged since the preceding spray are adequately covered, particularly on the lower surface.

Plantation hygiene

An important part of the control programme is the eradication of neglected plants near sprayed plantations as these provide spores to continually infect sprayed areas.

Leaves on harvested pseudostems also act as a source of spores to infect the following crop. These should be felled at harvest and chopped into pieces or 'topped' to help the decomposition of diseased tissues.

Empty containers

BEFORE disposing of any empty pesticide containers, ensure that they are rinsed at least twice with water, and that the rinsing water is preferably added to the spray tank to avoid waste of pesticide and money.

Double rinsing will remove the greatest portion of the container's contents.

By courtesy Agricultural and Veterinary Chemicals Association.

The rural year 1975-76

by Officers of Marketing Services Branch.

QUEENSLAND had a marginally more successful year in 1975-76 than other parts of Australia because of favourable seasonal conditions. The exception was in the south-west of the State where damaging floods occurred.

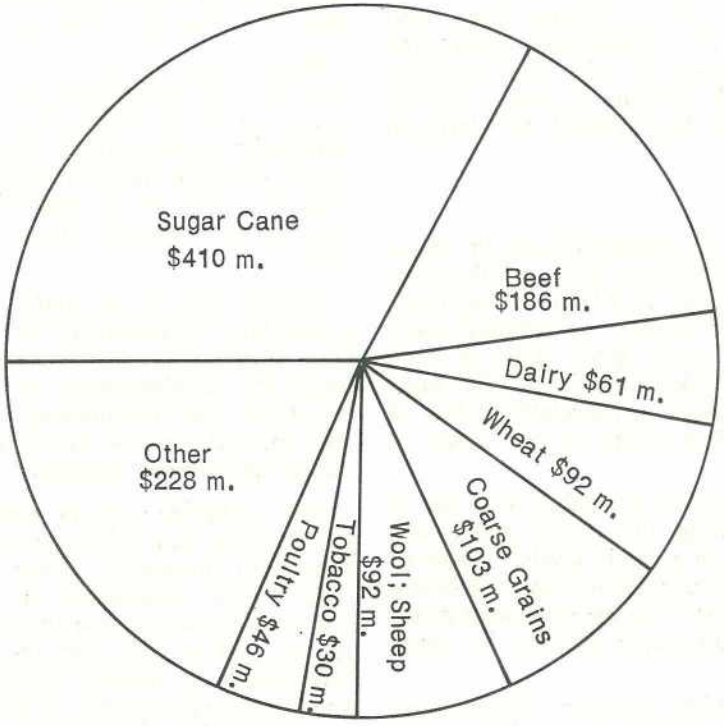
However, due to difficult overseas marketing conditions and severe cost pressures on the farm, Queensland's primary industries only just maintained their collective position at the end of the year.

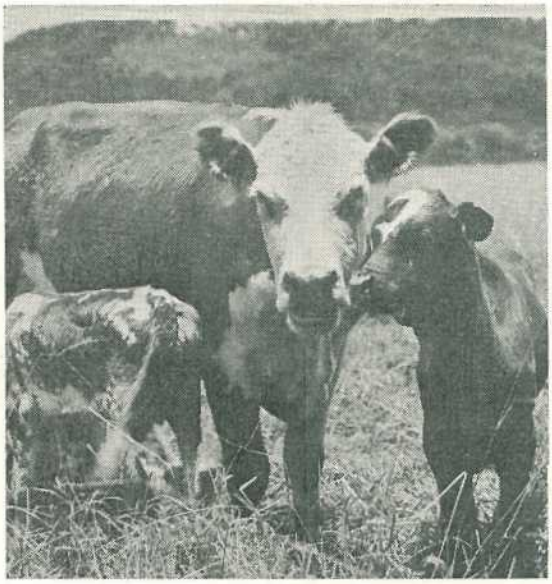
The gross value of production of the State's primary industries amounted to $1,248 million in 1975-76. This is an increase of 2.1% over the previous year.

The contributions made by the State's major industries are shown below.

On the national front, one of the most serious problems confronting the farm sector is the increase in farm costs. As a consequence, net farm income, estimated at $865m. for 1975-76 in real terms, is expected to be the lowest since 1970-71.

QUEENSLAND – Gross Value of Rural Production
1975–76





Short-term proposals should alleviate some of the pressing effects of the present beef surplus.

Added to increasing on-farm costs and downward pressures on commodity prices, the rural sector, in keeping with the economy generally, found it difficult to raise sufficient finance for capital development and carry-on purposes.

Sugar

The sugar industry continued to be the mainstay of the State's economy. Although the value of sugar production, at $410m., was lower than last year, the industry contributed about one-third of the State's gross value of rural production. The importance of the sugar industry to the economy, especially to that of the tropical, coastal areas of the State, is immense.

Export market prices for sugar were not as favourable as during the boom years, with prices back to more realistic levels. However, 1·85m. tonnes of sugar were exported during 1975. Prospects for 1976 are somewhat mixed at this stage with some decline in prices evident.

One of the major successes of the sugar industry was the ability to negotiate stable, long-term contracts with its major trading partners, especially Japan, Malaysia, Singapore, Korea and New Zealand. The loss of traditional markets, especially in the United Kingdom, has been largely offset by effective and aggressive international marketing by the industry itself and by the Queensland Government.

Beef

The problems of the beef industry continued in 1975-76.

Weak export markets continue to be the main problem. The industry has come to accept the basic fact of excessive cattle numbers resulting from the boom years of the beef industry in the middle of this decade.

This is not the fault of the grazier. During the boom years, our major beef markets in Japan and the United States put considerable pressure on Australian producers to satisfy demand in order to minimize rapid price increases on their markets due to domestic shortages. Consequently, Australian producers endeavoured to meet this demand.

Because the industry was unable to react in time to the indications that were becoming obvious early in 1974, the industry is faced today with an oversupply situation which cannot be cured in the short term. Much can be done, however, in the short term, to alleviate some of the pressing effects of the beef surplus.

To this end, as a matter of urgency, the Queensland Government formed the Queensland Beef Industry Committee of Enquiry, under the Chairmanship of the Minister to investigate and recommend short-term assistance measures and to look into long-term corrective and support measures.

The Committee has recommended, and the Government has implemented, a number of short-term proposals. These include rail and road freight concessions, a tickicide subsidy and emergency carry-on finance for producers. At the end of the year, the Committee was formulating an Industry Stabilization Scheme, and discussions leading to its implementation were proceeding with producers and State and Commonwealth Governments.

No magical formulas are available to conjure up immediate solutions, but it is encouraging to note that the economies of both Japan and the United States are improving.

Wool

On a brighter note, the wool industry experienced a much needed upturn during 1975-76. On preliminary estimates, Queensland wool production increased by some 5% during the year, while the total value of the clip is expected to have increased by some 7.8% to $83m.

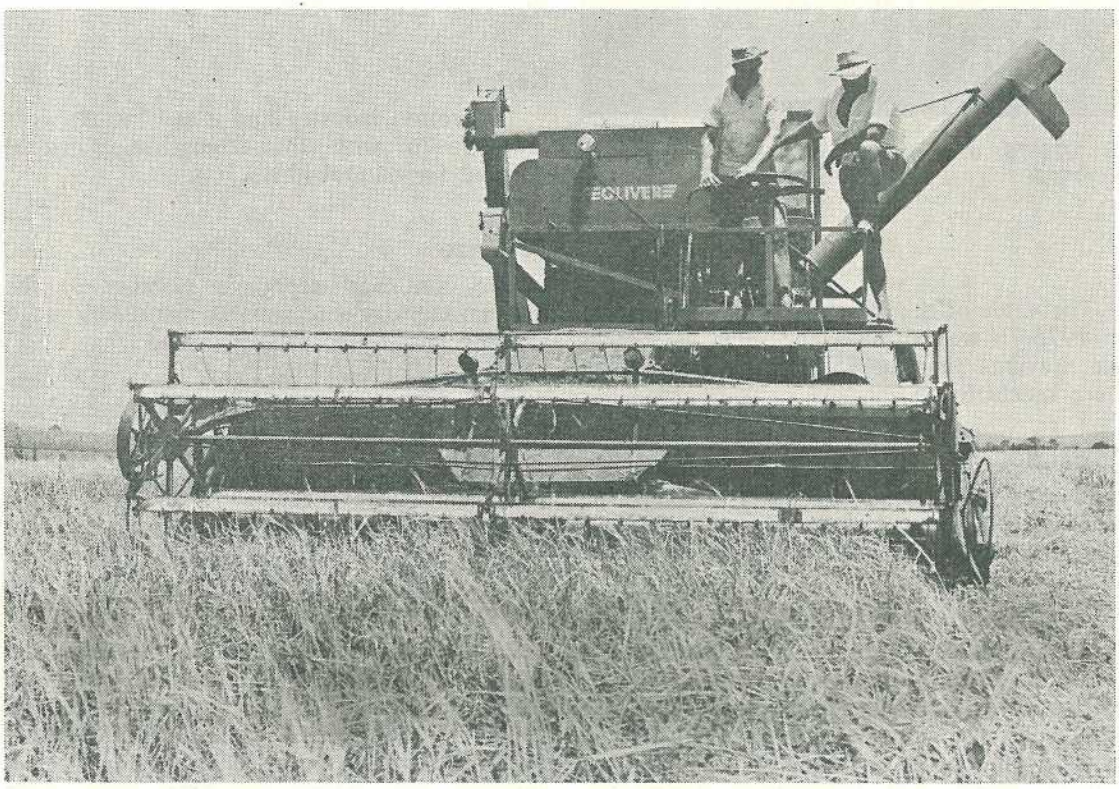
Improved world demand for natural fibres, due to substantial increases in the price of synthetic fibres, has assisted the Australian wool industry. On present indications, the immediate outlook for the wool industry is brighter than it has been for some years.

Grain

The grain industry in Queensland experienced satisfactory conditions in 1975-76 with both increased production and value. The major grain crops contributed some $196m. to the State's economy, an improvement of 17% on the previous year.

The value of the State's wheat crop was expected to be about $92m., up 19.0% on the value of last year's crop. Export demand was strong and prices satisfactory.

Barley production was a record with 361 000 tonnes being delivered to The Barley Marketing Board. Overall quality was down because of unsatisfactory seasonal conditions during harvest. A shortage of good quality malting grain is expected in 1976.



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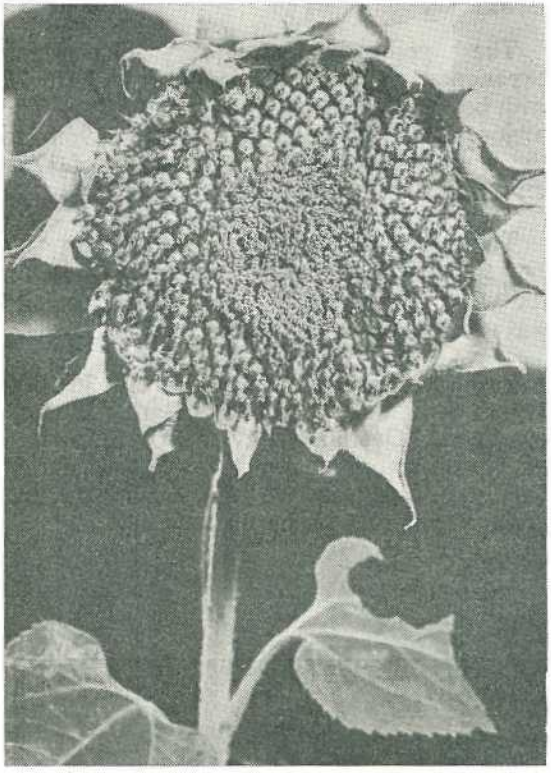


In 1975–76, over 60 000 tonnes of oilseed were exported.

The value of the State's grain sorghum crop in 1975-76 was virtually the same as that of the previous year, at $51.7m. Market prices were satisfactory.

Oilseed

Queensland oilseed industries entered the area of international marketing in a serious manner in 1975-76 with over 60 000 tonnes being exported.

Prices were a little depressed on last year's and the immediate prospects are uncertain. It is felt that, in the short term at least, some price stability is likely. However, as is the case with grains, the immediate prospects for oilseed prices will depend on the real effects of the drought which was experienced during the northern summer of 1976.

Peanuts and Navy beans

Both the peanut and navy bean industries experienced good conditions during 1975-76. Production and prices were at satisfactory levels. The results achieved by these two industries in the market place give testimony to the value of effective marketing of a quality product. Demand, both on the local and export markets, is substantially in excess of supply and at very attractive prices. Both industries are keen to expand production to take full advantage of this situation.

Rice

The rice industry expanded its area of operation in 1975-76, successfully harvesting commercial experimental plantings in the Mareeba district. Immediate prospects suggest an annual planting of 1500 hectares in the Mareeba district with greater potential possibly being available. This, of course, is in addition to normal plantings in the Lower Burdekin and the Herbert River areas.

Cotton

The cotton industry had a satisfactory year in 1975-76 with the strengthening world demand for natural fibres.

Tobacco

The continued economic viability of the tobacco industry is reasonably assured although taxation has caused serious inroads.

Queensland and Tasmania were the only States which did not implement a tobacco tax.

Fruit and vegetables

The fruit and vegetable industries are experiencing severe cost pressure both on the farm and in their marketing and distribution operations.

Of even greater concern, is the damaging impact of imported horticultural products. There are serious problems confronting the citrus industry because of imports more than twice the level of the previous year. The passionfruit and potato industries have been affected also, but to a lesser degree.

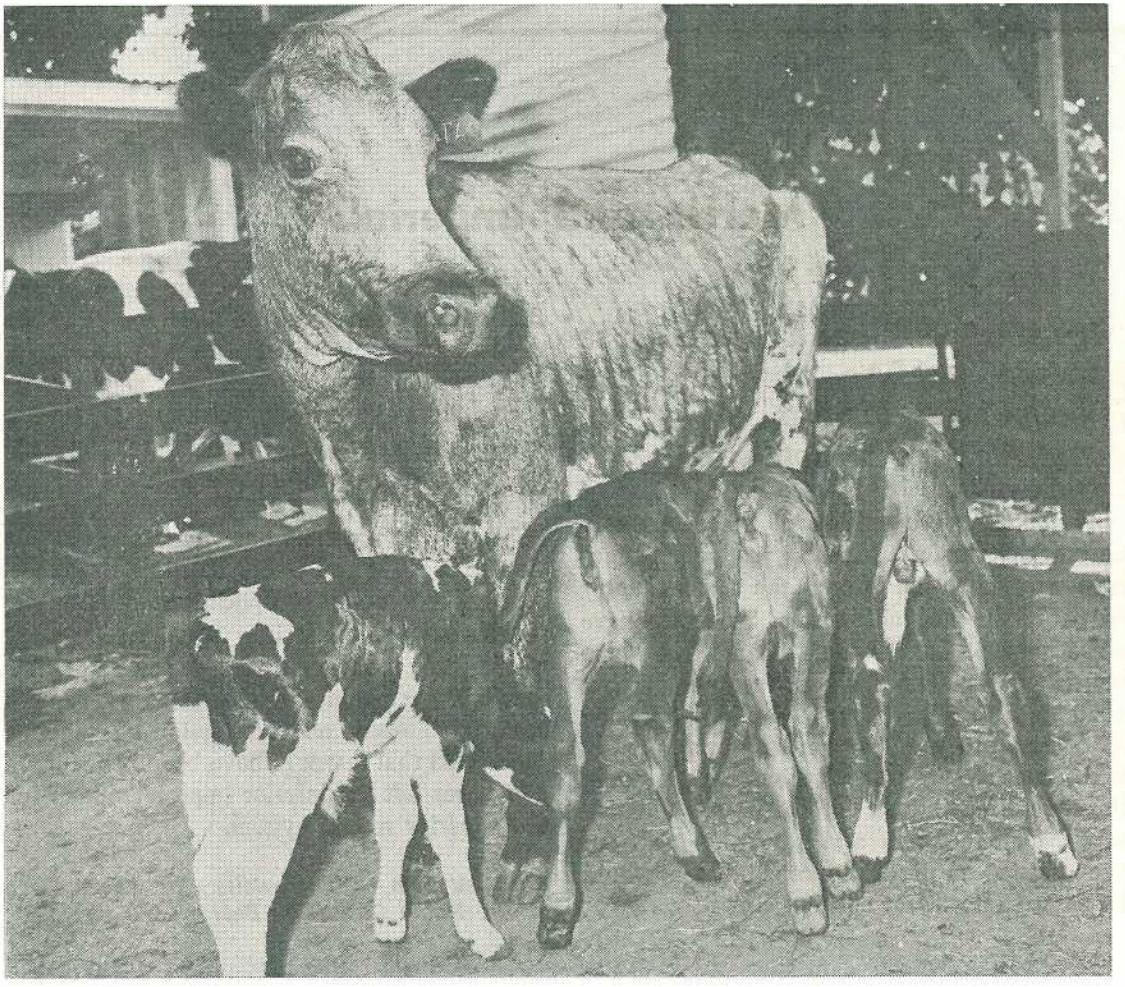
Dairy

The position of the dairy industry remained depressed during the year. The lack of demand for dairy products on world markets persisted, and no immediate improvement is expected in the foreseeable future. However, the northern hemisphere 1976 summer drought can only improve the marketing position from Australia's point of view.

In order to improve the industry's self-made problems, originating particularly in Victoria, considerable effort has been made towards arriving at improved marketing arrangements. Although Queensland dairy farmers are prepared to adopt a realistic attitude towards solving the national problem of over-supply, agreement cannot be reached in arriving at a satisfactory solution with surplus producers, particularly in Victoria.

Poultry

The poultry industry had a reasonably successful year in 1975-76. Due to the implementation and effective administration of a Hen Quota Scheme, egg production was brought more into balance with demand on the higher-priced domestic market. Egg producers are



The lack of demand for dairy products on world markets persisted.

now finding that returns per farm are increasing, though at lower production levels.

The chicken meat sector of the industry experienced some difficulties during the year. The position was not improved with a partial demand shift from the now comparatively more expensive chicken meat to the red meats, especially beef. The industry, however, was able to react to changing market conditions and the results at the end of the year were not altogether unsatisfactory.

With the formation of the Chicken Meat Industry Committee, on which both producers and processors will have equal representation, it is expected that internal industry problems will be resolved.

QUEENSLAND: GROSS VALUE OF RURAL PRODUCTION CONTRIBUTION BY MAJOR INDUSTRIES 1975–76

Crop	$'000	Per cent
Sugar Cane	410 348	32·87
Beef	186 285	14·92
Dairy	60 839	4·87
Wheat	92 053	7·37
Coarse Grains	103 382	8·28
Wool/Sheep	91 749	7·35
Tobacco	29 414	2·36
Poultry	46 029	3·69
Other	228 366	18·29
TOTAL	1 248 465	100·00

(SOURCE: Australian Bureau of Statistics)

Metric and Imperial?

"There should be a compromise between the use of metric and imperial measurements . . . why not adopt the best of both worlds?

If changes were only made where a direct cost benefit indicated it was justified, inefficiency and confusion through the whole country would be the inevitable result. We would have some imperial-sized panel board and some metric speed limits in kilometres per hour but road signs in miles. One group would decide to continue to use Whitworth screws, another SAE, another BSF, while others would adopt the modern ISO metric threads. As a result, screw manufacturers and stockists, far from economising on production and storage, would be forced into a less efficient situation.

These and other dual situations would mean that our children and even their grandchildren would have to learn two systems at school. They would have to become and remain accomplished at conversion exercises ("Convert 1 mile, 2 furlongs, 1 chain, 3 yards, 2 feet, 1½ inches into metric measure").

To aim for anything but progressive conversion to the sole use of the metric system is to espouse perpetual complication, duplication, inefficiency and confusion. The idea of indefinitely using both systems side by side must inevitably result in so many areas where mismatch will occur and conversion calculations be needed that it would have been better if we had never left the inferior imperial system for the superior metric system.

Reprinted from MCB Newsletter, the official organ of The Metric Conversion Board.

Oilseeds

High demand for these dual purpose crops

by B. W. Simpson, Ag.Chem.

BECAUSE of recent changes in domestic requirements oilseeds are now among some of the most important agricultural crops.

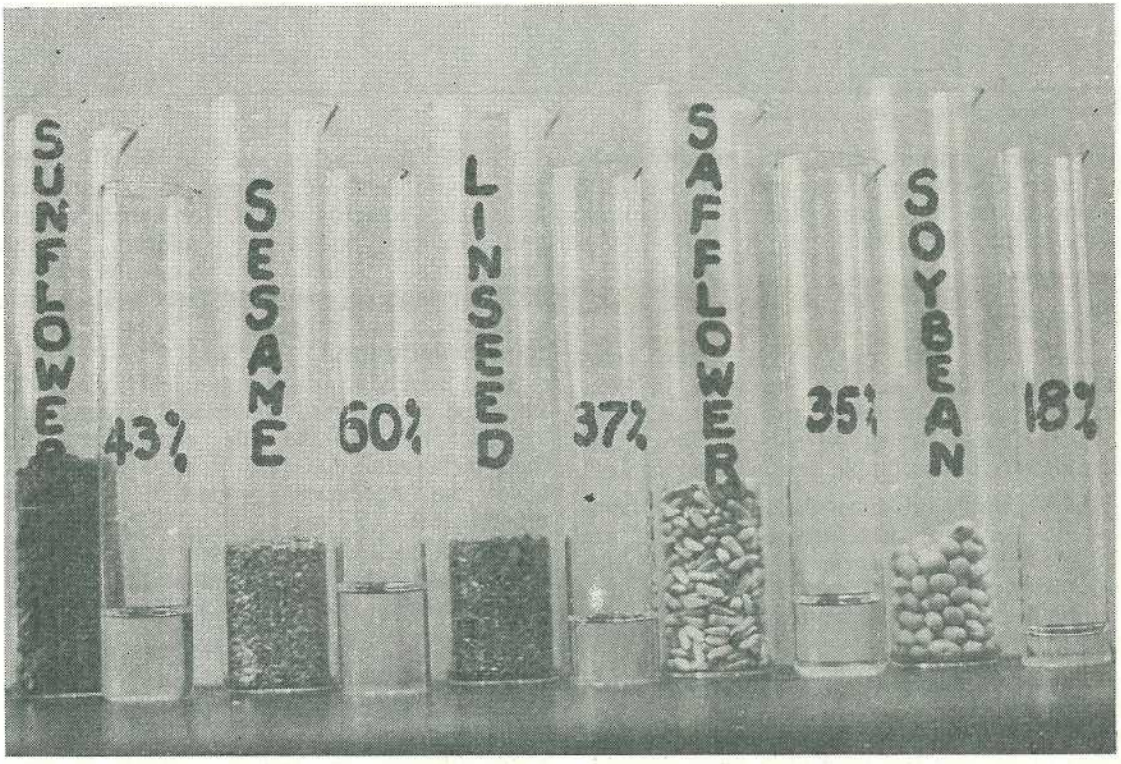
Until a few years ago, linseed was the major oilseed crop grown in Australia but now there are thousands of hectares of sunflower, safflower, soybean, rapeseed and others. This sudden change has prompted detailed research by agricultural scientists to find the most suitable varieties and conditions to achieve the best production.

Oil content

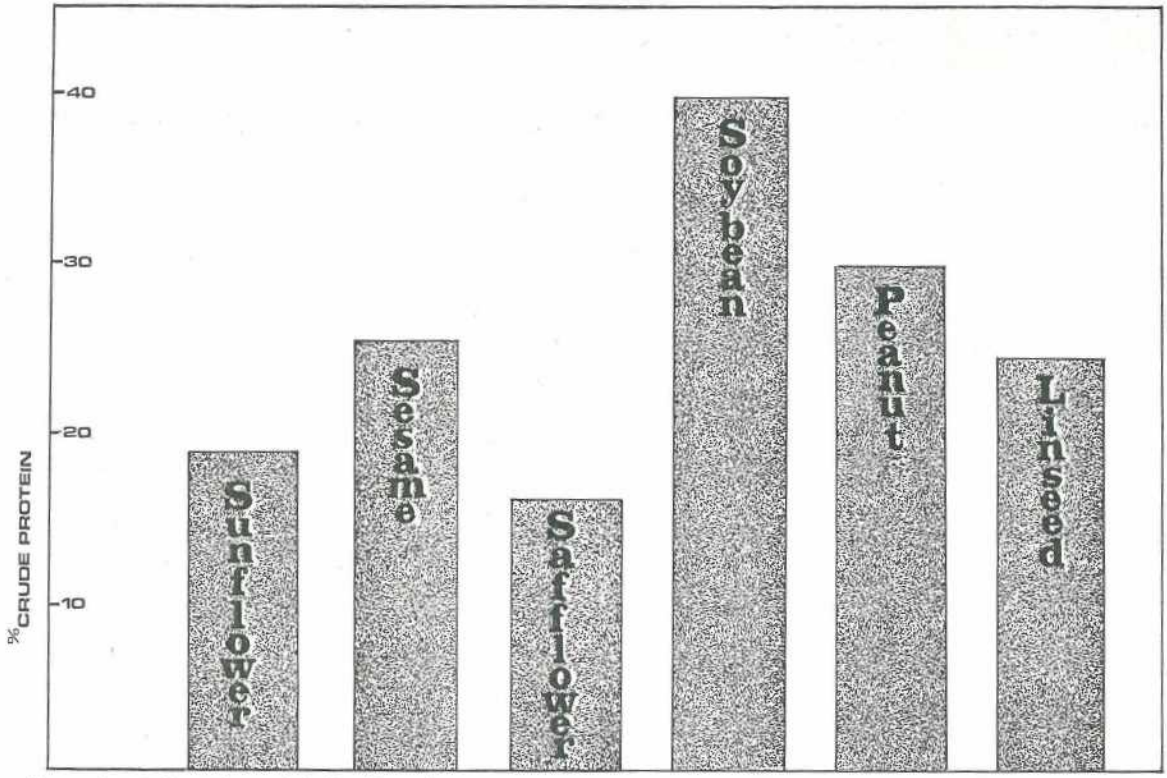
The oil content of oilseed crops varies considerably. Of the commercial crops, sesame would have one of the highest oil contents with up to 60% oil on a dry weight basis. Rapeseed, sunflower and safflower would rate as high oil producers with yields between 35 and 50%.

Almost all seeds from agronomic crops contain some oil, for example, wheat 2% and maize 6%. However, only those with reasonably high yields are used as oil producers.

Recently, research has been carried out on oil-producing pasture crops, such as sub clover. It is now obvious that certain varieties contain edible oil at the same level as found in soybeans together with a high protein content.



Percentage of oil in oilseeds. Identical weights of oilseeds are shown in each case.



Percentage of crude protein in oilseeds.

Since these pasture crops are usually well-adapted to certain areas and require little maintenance, they may find an important place in the oilseed field.

Oil quality

The term 'oil quality' is often used incorrectly since it must be used in conjunction with the proposed use. For example, a good quality drying oil such as linseed, is completely unacceptable as a cooking oil.

All vegetable oils have the same basic components—glycerol and fatty acids which are linked together to form triglycerides. The fatty acid components vary from one species to another and these are responsible for the properties of the oil.

Linseed oil has a high percentage of linolenic acid which is necessary for the painting industry. Sunflower and safflower oils have high levels of linoleic and very little linolenic acid. This makes them highly suited as edible oils.

Certain fatty acids, such as palmitic acid and stearic acid are referred to as saturated fatty acids whereas others, for example oleic and linoleic acids, are referred to as unsaturated. Animal fats normally contain 45% or more of saturated fatty acids which gives them the property of being solid at room temperature.

Most vegetable oils contain less than 15% saturated fatty acids. Palm and coconut oils are exceptions to the rule, containing more than 50% saturated fatty acids. These oils have the necessary properties for soap manufacture.

Linoleic acid which is present in most edible oils is referred to as a polyunsatured fatty acid and the oil is classed as a polyunsaturated oil.

Other components of oil

These additional components usually add up to less than 5% of the oil.

- *Phosphatides* are found primarily in soybeans. Lecithins are an example.

- *Sterols.* Various types of this component are found. Cholesterol is found in animal fats. Vegetable oils contain phytosterols which may be used in the synthesis of various hormonal preparations and vitamin D.
- *Pigments* are primarily carotenoids. This gives the oil its yellow appearance.
- *Tocopherols* are the natural anti-oxidants which contribute to the good stability of vegetable oils.
- *Free fatty acids* occur naturally but their level is increased as a result of heat or enzyme action.

Uses of vegetable oil

- Edible oils.
- Paints. Linseed oil may be of increasing importance due to potential world shortages of petrochemical products required for the manufacture of acrylic paints.
- Synthetic resins and printing inks from sunflower and safflower oils.
- Lubricants.
- Cosmetics from avocado and almond oils.
- Soaps.

Protein

Oilseeds are unique in that they are a dual purpose crop providing large quantities of both oil and protein. Since both of these are in high demand on world markets, the value of these crops can be well appreciated.

After the oil has been extracted from the seed (usually a combination of screw pressing and solvent extraction), the remaining meal is an extremely good protein source. The quantity and quality of protein varies from one species to another.

Protein consists of smaller units called amino acids. There are about twenty different amino acids found in protein, some of which are more important than others.

For monogastric animals, such as pigs, poultry and humans, there are the essential amino acids which are necessary for good health but cannot be manufactured by the body. These amino acids must therefore be part of the diet. The level of these components in grain-based feed is extremely important.

Soybean is rich in the essential amino acid lysine but low in the important sulphur-containing amino acid methionine. Since crops such as sorghum and maize have adequate methionine but are low in lysine, it can easily be seen how correct feed formulation is important.

Some protein meals contain natural chemical toxins which, fortunately, can be removed or detoxified during processing. Soybeans contain a trypsin-inhibitory enzyme which is effectively destroyed by heat treatment.

Cottonseed meal which contains a toxic phenolic compound known as gossypol can also be rendered safe by heat treatment. However, this treatment can also destroy some of the essential amino acid lysine. Additional lysine is often added when used for monogastrics.

Carbohydrates

The other major component of oilseeds is carbohydrate which makes up 25 to 35% of the meal. This carbohydrate fraction contains both the insoluble cellulose component (crude fibre) and the soluble carbohydrate (starch, sugars) which are of great importance as an energy source.

Future

Since the domestic market requires vegetable oils both for the cooking and the margarine industry, there will be a constant demand for this product.

Until recently, protein meal has been used almost exclusively for the stockfood market. However, dramatic changes in recent years have shown the great importance of vegetable proteins in helping to solve the world's nutritional problems.

As demand slowly increases, Australia will be producing more of this valuable crop.

AGRICULTURAL PRODUCTION, QUEENSLAND, 1973–74

Crop	Area	Production	Value
	hectares	tonnes	$'000
Soybeans ..	32 181	48 929	8 720
Linseed ..	1 852	1 504	305
Peanuts ..	25 724	29 119	10 852
Safflower ..	9 575	5 928	874
Sunflower ..	67 487	43 189	8 759

N.B.: The above data was obtained from Rural Production, Queensland, 1973–74 Season by the Australian Bureau of Statistics, Brisbane.

Peanuts

Summary of Insect Control Recommendations

Prepared by Entomology Branch Officers.

The following tabulation summarizes the pesticide recommendations for peanuts. Further details on identification and control of pests listed and of minor pests not listed should be sought from extension officers of the Department.

Pest	Description of Pest and Damage	When is Control Warranted?	Control Measures (All Rates are Active Constituents)
Native Bud Worm (Heliothis)	Larvae grow up to 40 mm in length and vary considerably in colour. The moths are solid-bodied with a wing span of 40 mm	Populations of 12 or more larvae per metre of row will cause losses in well-grown plants. With populations of this level, virus disease outbreaks are common and may remove the necessity for control measures	endosulphan 735 g/ha
Jassids	Jassids are small, bright green or yellowish-green insects, up to 3 mm long, hopping or flying when approached. Small numbers of jassids cause silvery spots in foliage, larger numbers cause yellowing of leaf tips	No definite point at which spraying is warranted can be stated. Overseas experience suggests that control of moderate populations while improving the appearance of the crop does not increase yield. Control of high populations will increase yield	dimethoate 140 g/ha (This rate is based on spraying a complete cover of large plants and may be reduced when spraying rows and small plants)

Pest	Description of Pest and Damage	When is Control Warranted?	Control Measures (All Rates are Active Constituents)
Whitegrubs	The white, c-shaped larvae which grow to 26 mm in length, feed underground on the developing nuts and shells	Control measures are warranted in areas of scrub soils with a history of the problem as the larvae not only cause direct damage but also stimulate white mould problems	Despite current trials no acceptable chemical control has been developed. Prompt harvesting of damaged areas will reduce losses. Deep ploughing using discs may reduce the severity of the problem
Peanut Mite	The mites are oval-shaped, 0·5 mm in length, green to black in colour, and more actively when disturbed. Infestations are associated with silvering of the leaves	Attacks are most severe on young plants during periods of dry weather. Chemical applications are necessary when infestations are observed to ensure survival of plants through the dry period	dimethoate 140 g/ha (Spot spraying can be used to reduce outlay)

Material	Percentage Active Constituent	Grams Active Constituent per Litre	Quantity of Product (ml/ha)
endosulphan	35%	350 g/l	2 100 ml/ha
dimethoate	40%	400 g/l	350 ml/ha
	30%	300 g/l	470 ml/ha

Crops sprayed with endosulphan and dimethoate should not be fed to stock within 7 days of treatment.

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Legume inoculation

LEGUMES are valuable as a source of protein for man and animals and for increasing the nitrogen content of soil.

Nodule bacteria (*Rhizobium* spp.) enter roots and induce the formation of round or elongated outgrowths called nodules (Plate 1) in which nitrogen from the atmosphere is made available for plant use.

Nodule bacteria suitable for most introduced legumes rarely occur naturally in soils in Queensland. Often the naturally occurring bacteria are not efficient suppliers of nitrogen. Effective nodules are large with pink-coloured centres while ineffective nodules are small and white centered (Plate 2).

Effective nodulation

To ensure effective nodulation, suitable nodule bacteria in a peat carrier are added to seed prior to planting. Seed inoculation (Plate 3) involves stirring the inoculant into a slurry with a sticker such as skim milk or gum arabic and mixing it thoroughly with the seed to leave a fine black coating. Dry inoculation is unsatisfactory.

Microbiologists have selected efficient bacteria for each of the commonly used legumes (Plate 4) and each packet of commercial inoculant is clearly marked with the names of the legumes on which it is effective and the expiry date indicating the safe period of usage.

Quality control

Control on the quality of inoculants is supervised by the Australian Inoculants Research and Control Service (A.I.R.C.S.). Only approved strains are used and cultures must contain a high count of nodule bacteria free of other organisms.

Nodule bacteria are sensitive, living organisms that must be handled carefully, particularly after the seed has been inoculated. Pelleting inoculated seed with lime or bauxite protects the bacteria from the harmful effects of fertilizersand soil acidity (Plate 5).

Plate 5B shows good pellets, while C and D show unsatisfactory pellets due to incorrect quantities of pelleting materials. With practice, satisfactory pellets can be easily produced. Although pelleted, inoculated seed can be stored under cool conditions (15°C) for up to two weeks, best results are obtained when seeds are planted into a moist seedbed soon after inoculation.

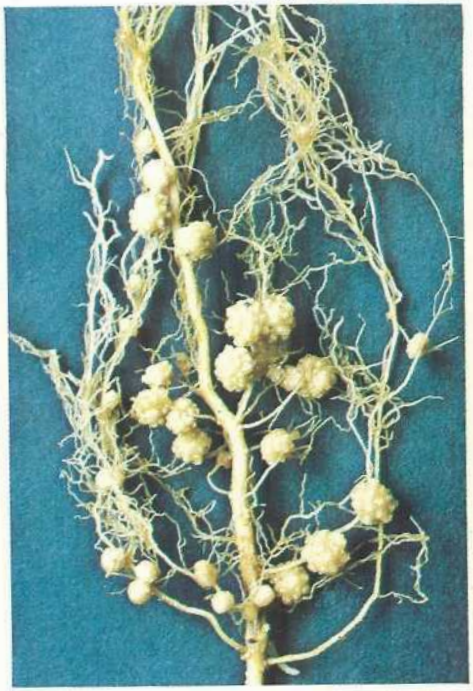


Plate 1. Nodules on Centrosema.

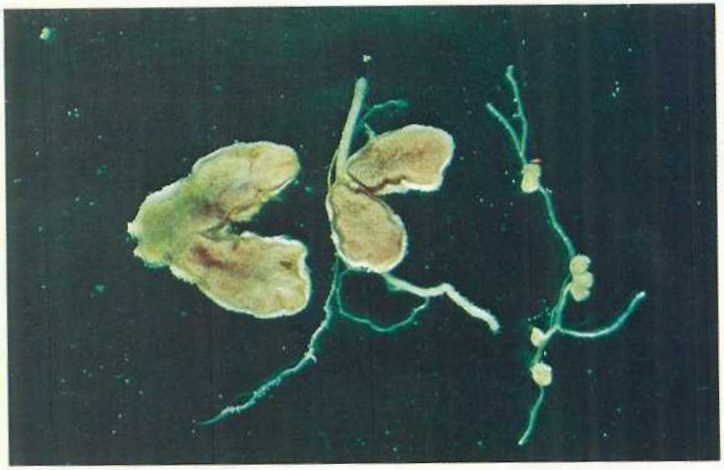


Plate 2. Large effective and small ineffective nodules.

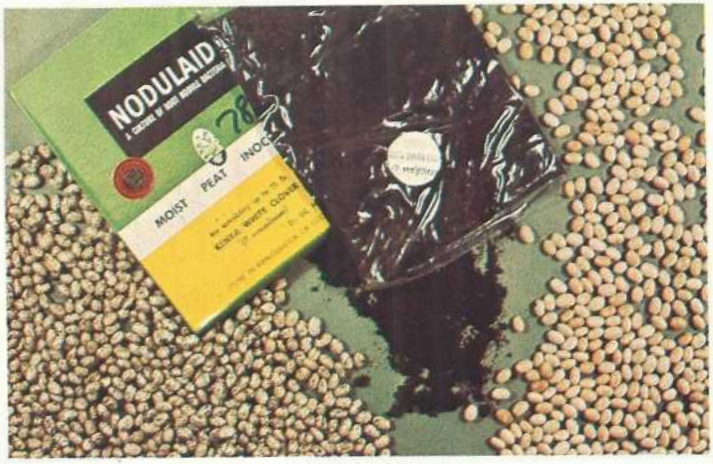


Plate 3. Inoculation of seed.

Plate 4. Scientific testing.

Plate 5. Pelleting inoculated seed.

Plate 6. When soil nitrogen runs short.

Plate 7. Natural, effective nodulation of peanuts.

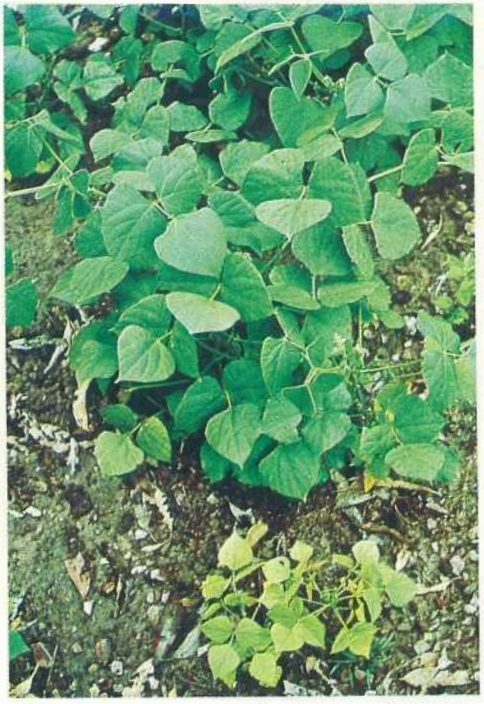


Plate 8. Growth benefits from nodulation.

Benefits

Benefits obtained from inoculating seed depend on the crop and the natural fertility of the soil. The greatest differences occur on poor soils. This is shown in Plate 8 where an example showing a small, yellow, non-nodulated lablab bean in the foreground is compared with the healthy, nodulated plant behind it.

Nitrogen deficient plants are yellow and stunted with the older leaves yellowing and dying first. Such plants respond rapidly to an application of nitrogen fertilizer. Poor nodulation reduces the yield as well as the nutritive value of a pasture.

Cheaper alternative

Nodule nitrogen is a cheaper alternative to nitrogen fertilizers in some grain legume crops.

Plate 6 compares a non-nodulated navy bean crop which has run out of soil nitrogen with a nodulated soybean crop receiving an adequate supply of nitrogen. Nodule bacteria supply only nitrogen and other nutrient deficiencies must be corrected by the application of appropriate fertilizers.

Not all legumes sown in Queensland need to be inoculated. Peanuts and siratro naturally nodulate effectively in most soils (Plate 7). Peas and French beans are also not inoculated because fungicides which are harmful to nodule bacteria are commonly used to ensure good emergence. Also the nitrogen supplied by nodules is of limited value with these short term crops.

Compiled by A. Diatloff and D. G. Hutton,
Plant Pathology Branch.

(Further information may be obtained by writing to the Director, Plant Pathology Branch, Department of Primary Industries, Meiers Road, Indooroopilly, Q. 4068).

The Emerald Irrigation Scheme

by G. D. Keefer, Agriculture Branch; and R. C. McDonald and R. J. Tucker, Agricultural Chemistry Branch.

THE variable and unreliable rainfall of the Fitzroy River basin in central Queensland has restricted primary production from a region which is otherwise ideally suited to a wide range of agricultural and pastoral enterprises.

At Emerald in Central Western Queensland, an irrigation scheme is being developed as a joint Commonwealth and State undertaking. As well as developing the State's natural resources, the objectives are to stabilize agricultural production in the area and to act as a focus for decentralisation.

With irrigation, the climate and soils of the Emerald area can produce high yields of quality cotton as well as a whole range of grain, oilseed and fodder crops. The irrigation development can be expected to attract new industries and services which will also benefit the dryland producers of the Central Highlands, a region from north of Clermont to south of Springsure. The storage dam also provides a tourist attraction and offers an additional outdoor recreation area for the residents of inland Central Queensland.

Originally planned for irrigation only, the scheme is now a dual purpose project providing water both for irrigation and for further coal mining and possible power generation in the Blackwater-Dysart region.

Irrigation works

The Fairbairn Dam, 19 kilometres upstream of Emerald on the Nogoa River, was constructed to provide water for the scheme. The dam has a storage capacity of 1 439 000 megalitres. It is the largest water storage in Queensland and was completed in 1972 at a cost of $20 million.

An analysis of past rainfall and run-off records indicates that 147 000 megalitres could be supplied from the storage each year without imposing restrictions on water use during drought periods. That is, the annual assured supply from the dam is 10% of the total storage capacity.

Some of this water will be released down the river to the Selma and Town Weirs near Emerald and to the Bedford and Bingegang Weirs near Blackwater. These releases will:

- Assure supply to the towns of Emerald, Blackwater and Dysart.
- Provide water for associated mining and industrial operations.
- Provide water for private irrigation pumping from the river.

The balance will be diverted from the dam through channel systems on each bank of the river to individual farms in the irrigation area.

IRRIGATION AREA

Left bank

The Selma main channel will serve farms on the left or western bank of the Nogoa River. Forty-five irrigation farms will be established on this bank.

Of these 45 farms, two will be wholly irrigated by pumping from the river and two others will have a supplementary allocation from the river. In the relift area above Selma channel, eight farms will be developed for private pumping from the channel. The remainder will be supplied by gravity flow from the channel system.

Each farm is designed to have a minimum area of 200 hectares of irrigable soils. The annual water allocation is 4 megalitres per irrigable hectare of which three megalitres is

a Water Right to be paid for whether used or not and the balance a sales quota to be paid for as used. At present, the cost of water is $6.00 per megalitre.

It is anticipated that works to serve all left bank farms will be completed by June 1977.

Right bank

The right bank will be served by gravity from the Weemah main channel. It is anticipated that construction of works to serve the right bank will be commenced during the latter part of the 1976/77 financial year.

Soils

The major soils on the left bank are all cracking clay soils. They can be described under three main headings.

(1) Dark cracking clays derived from relatively little weathered basalt (black earths, average depth 80 cm).

These soils are often referred to as open Downs soils or black soils.

The natural vegetation is tussock grassland.

(2) Dark cracking clays derived from deeply weathered basalt (black earths, average depth 150 cm+).

The natural vegetation is dense brigalow, yellowwood, belah scrub.

(3) Dark, grey and brown cracking clays often slightly to moderately gilgaied, derived from alluvia (black earths, grey and brown clays).

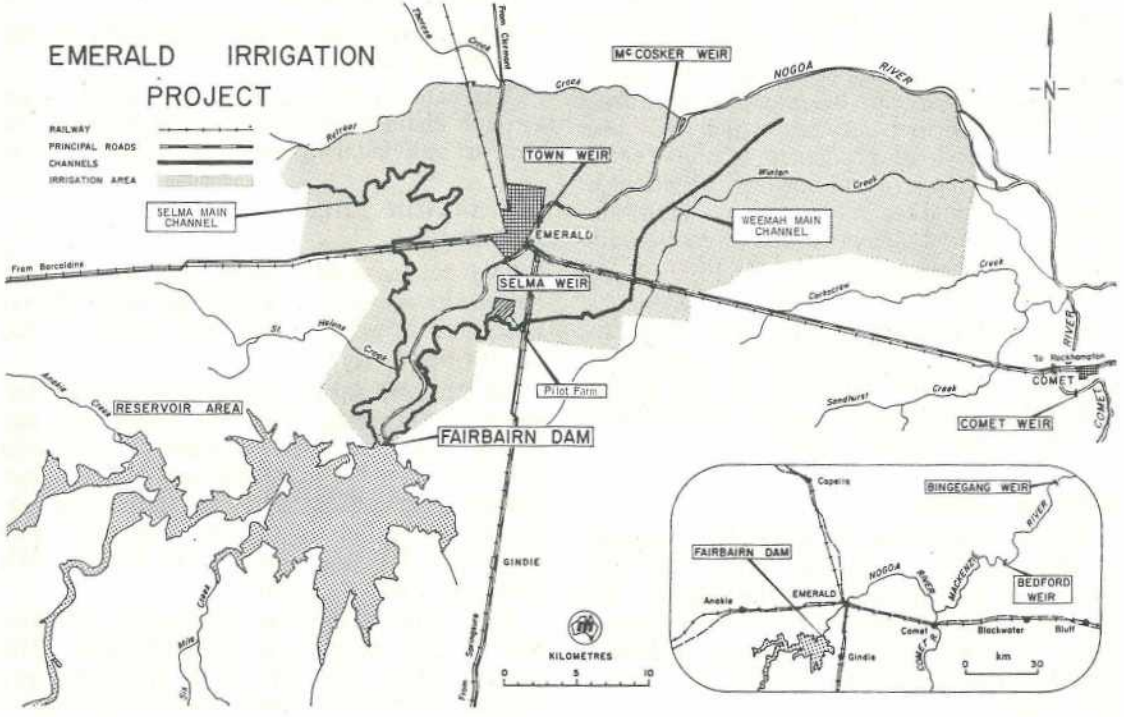
The natural vegetation is brigalow, yellowwood scrub. All these soils can be irrigated quite successfully.

On the right bank as well as the cracking clays there are extensive areas of soils that are difficult to irrigate. These can be grouped as:

(1) Very shallow, sandy clay loams to clay loams over extremely hard brown and dark clays (solodized solonetz).

The natural vegetation is brigalow, blackbutt or Dawson gum scrub.

(2) Shallow, sandy loams over extremely hard, mottled yellow grey clays (solodized solonetz).



The natural vegetation is poplar box forest. (3) Reddish brown, sandy loams gradually increasing with depth to red sandy clay loams or sandy clays (red earths).

The natural vegetation is silver leaf iron bark forest.

These three soils are represented on Pilot Farm 2. Results from this farm which has been in operation since 1966 have not justified further development of these soils for irrigation. They are associated in a complex distribution with cracking clays leading to difficulties with surface irrigation. Also, the sandy loams have a hard-setting surface which causes emergence problems.

The major factor limiting productivity on the solodized solonetz soils (1 and 2) is the low level of moisture available to the plant. This results from the relatively impermeable subsoil, and consequently the shallow root zone and the low water holding capacity of this coarse textured root zone.

The red earths (3) would be suitable for vegetable and tree crops because of their good drainage. However, they have a high fertilizer requirement and would need frequent irrigation.

Irrigation development on the right bank will avoid the problem soils and concentrate on the cracking clay soils.

Research

Research into crop management and varieties has been under way since 1966. Information obtained to date will be reviewed in future issues of this journal.

The most promising crops have been cotton, soybeans and wheat. The growing of sorghum, sunflower, safflower and linseed has also been investigated.

Irrigation layout and management are problems particularly on the 1 to 2% slopes. As there is no experience with irrigation of heavy clay soils on steeply sloping lands, the Irrigation Commission is testing various alternatives. Through experience, individual growers will develop compromise solutions to meet their own needs and to cut down on soil loss through erosion.

The existing growers have formed an Irrigators' Association which provides them with a single voice to Departmental and industry organizations responsible for servicing the Irrigation Area.

Irrigated wheat at Emerald

by G. D. Keefer, Agriculture Branch.

THE results of trials conducted since 1968 show that irrigated wheat is the most promising winter crop for the Emerald Irrigation Area.

Soils

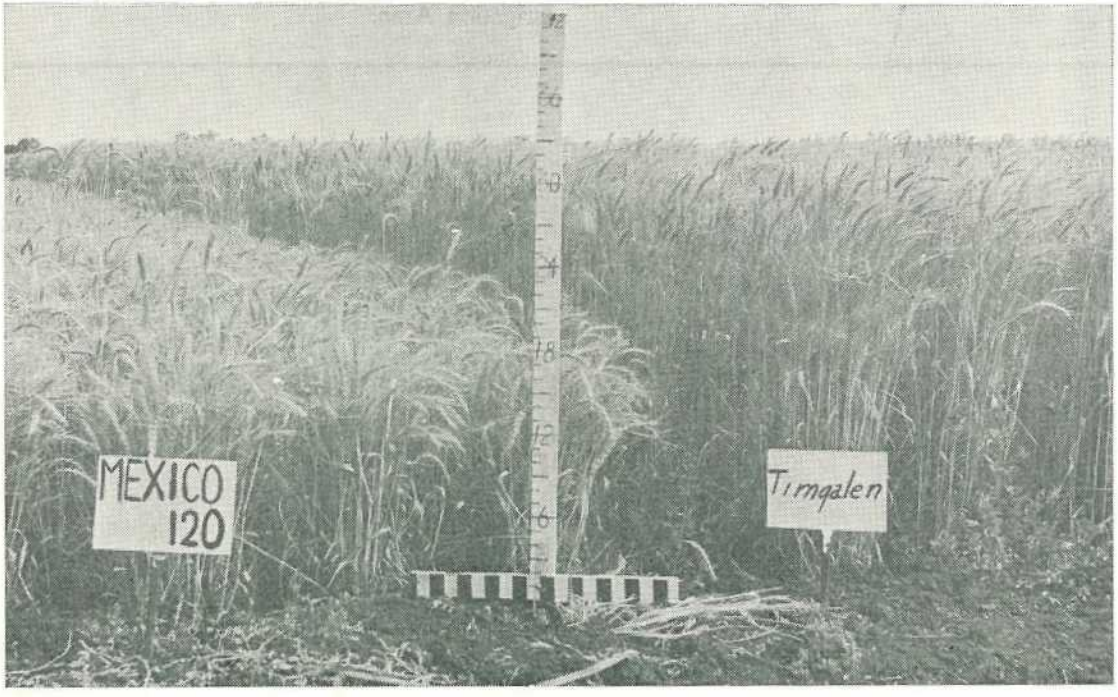
Up to 1971, the trials were conducted on a deep, cracking clay which had originally carried a brigalow-yellow wood scrub. In 1972, the trials were transferred to a shallow, open Downs cracking clay.

These soils are representative of a major portion of the Emerald Irrigation Area. They are also very similar to soils being used for irrigated cropping in southern Queensland.

Varieties

Between 1968 and 1974, 287 different lines of wheat were tested under irrigation at Emerald. It soon became obvious that there were a number of lines with dwarf Mexican parentage which had consistently higher yield potential (20 to 40%) than Timgalen, the best of the Australian commercial lines.

The most promising was an unnamed semi-dwarf crossbred WW 15 introduced from Mexico by plant breeders of the New South Wales Department of Agriculture in 1963. It was a low-protein, red-grained wheat and as such was not acceptable to the Australian marketing authorities. The dwarf wheat



A height comparison between Mexico 120 and Timgalen (height in inches).

Mexico 120 also yielded well, but again grain quality was not acceptable. WW 80, a semi-dwarf crossbred with Gabo in its parentage yielded slightly lower but it did have white grain. At Emerald, the highest yields from these three lines were: WW 15—5199 kg per ha; Mexico 120—4969 kg per ha; WW 80—4778 kg per ha.

Their high yield potential was recognised by plant breeders and a crossing programme was commenced to incorporate the high yield potential of the semi-dwarfs in a wheat of acceptable quality. Oxley, which was released in 1974 by the Queensland Wheat Research Institute was bred from WW 15 and WW 80. This fully-awned, white-grained variety is acceptable for Prime Hard classification. In one trial at Emerald, Oxley produced 4821 kg of grain per ha.

Kite, a near awnless semi-dwarf, has also given good grain yields, but it is accepted only for No. 1 Hard classification. At present, Oxley and Kite are the most promising wheats for irrigation in Queensland.

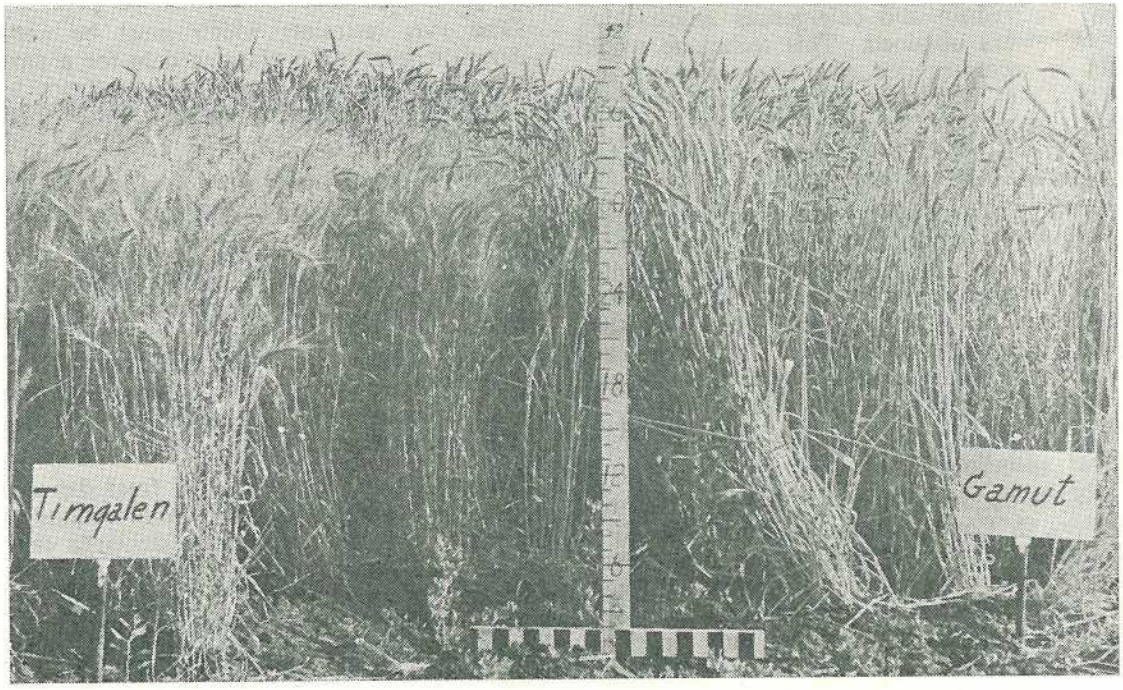
Height and lodging

Taller varieties of wheat, particularly Spica, are prone to severe lodging under high fertilizer levels and good moisture conditions. The dwarfs (Mexico 120) and the semi-dwarfs (Oxley and Kite) showed good standability in these conditions. Mexico 120 did not exceed 60 cm in height when grown under irrigation at Emerald, while Timgalen exceeded 90 cm, and the taller varieties such as Spica and Gamut, exceeded 115 cm.

Research has shown that resistance to lodging is not the most important factor in determining the higher yield potential of the semi-dwarfs under Australian conditions. Longer ears, more grains per ear, and a higher ratio of grain yield to total plant weight (called the harvest index) were found to be just as important.

Seedling rates, plant populations

In the variety trials, a range of planting rates was used and established populations ranged from 1·29 to 3·13 million plants per hectare.



A height comparison between Timgalen and Gamut (height in inches).

In 2 years on the scrub soil, a range of varieties were sown at three seeding rates 50, 90 and 140 kg seed per ha. Under the conditions of these trials, the lower seeding rates compensated with tillering and an established population of 100 plants per sq m was adequate.

A seeding rate of 60 to 70 kg seed per ha should be sufficient to establish at least 100 plants per sq m even with field emergence as low as 60%.

The dwarfs and semi-dwarfs may perform better at higher populations, and their field emergences are often lower than the taller varieties.

Planting techniques

When planting into moist soil using conventional combine points, a good soil tilth is required. On these heavy soils, the moisture at sowing depth (5 to 8 cm) was usually adequate 10 to 14 days after rain or preplant irrigation and emergences varied between 54 and 68%. In one trial, planting was delayed 18 days following a preplant irrigation and only 30% of the seed emerged.

In 1974, the seed was sown into dry soil and watered-up and emergences approaching 100% were obtained. This technique would not be recommended where winter weeds are a problem. Volunteer sunflower and Mexican poppy are weeds to watch, but they can be controlled with 2, 4-D sprays (50% 2, 4-D amine at 1130 ml per ha).

The plants adjoining the irrigation furrow do not fully compensate for the loss of productive area. One solution is to establish plants in the furrow by sowing through every drill of the combine and furrowing-out immediately after planting. This is most successful when the seed is sown into dry soil and watered-up.

Best planting time

Work carried out at the Biloela Research Station in Central Queensland and the Kimberley Research Station on the Ord River, indicates that the best planting time for wheat in northern Australia is in May. Lower yields can be expected from June and July plantings.

The best planting time is related to the growth and development of the plants. In figure 1, the time taken to reach various growth stages is shown for a mid May planting.

Tillering begins at about 4 weeks from planting. The critical heading to flower period is 10 to 13·5 weeks from planting with flowering taking place at about 13 weeks. Grain filling is complete at approximately 19 weeks, and during the following 3 weeks, the grain dies-out to 12% grain moisture ready for harvest and storage.

Different varieties exhibit different rates of development. However, these differences are not as great in the relatively warm winters of the Central Highlands as they are at higher latitudes.

Factors which speed-up development include high populations, high temperatures, and high levels of soil phosphate either applied or native to the soil. However, high levels of nitrogen retard development.

A mid June to mid July planting flowers in approximately 11·5 weeks and harvest can take place at 18 weeks from planting. On the other hand, a mid April planting would take 95 days to commence flowering and would be ready for harvest in 24 weeks from planting.

The two restraints which must be considered in selecting a planting date for a particular variety are: the rapid rise in temperature during the spring months, and frost expectancy.

The conditions prevailing at Emerald in relation to these two factors are summarized in figure 1.

A crop planted later than May 28 (week 22), while avoiding the most likely frost period at flowering, will be filling the grain when maximum temperatures are well over 27°C (80°F). The higher temperatures shorten the plants' vegetative phase and the grain filling phase and reduce yield.

Wheat is most susceptible to frost damage during the heading-flowering period. Although the timing and severity of frost incidence cannot be predicted for a particular season, it is advisable to plant so as to avoid heading-flowering during the most likely period of heavy frosts from July 5 to July 24. The middle of May would be the best planting time to avoid this period at flowering.

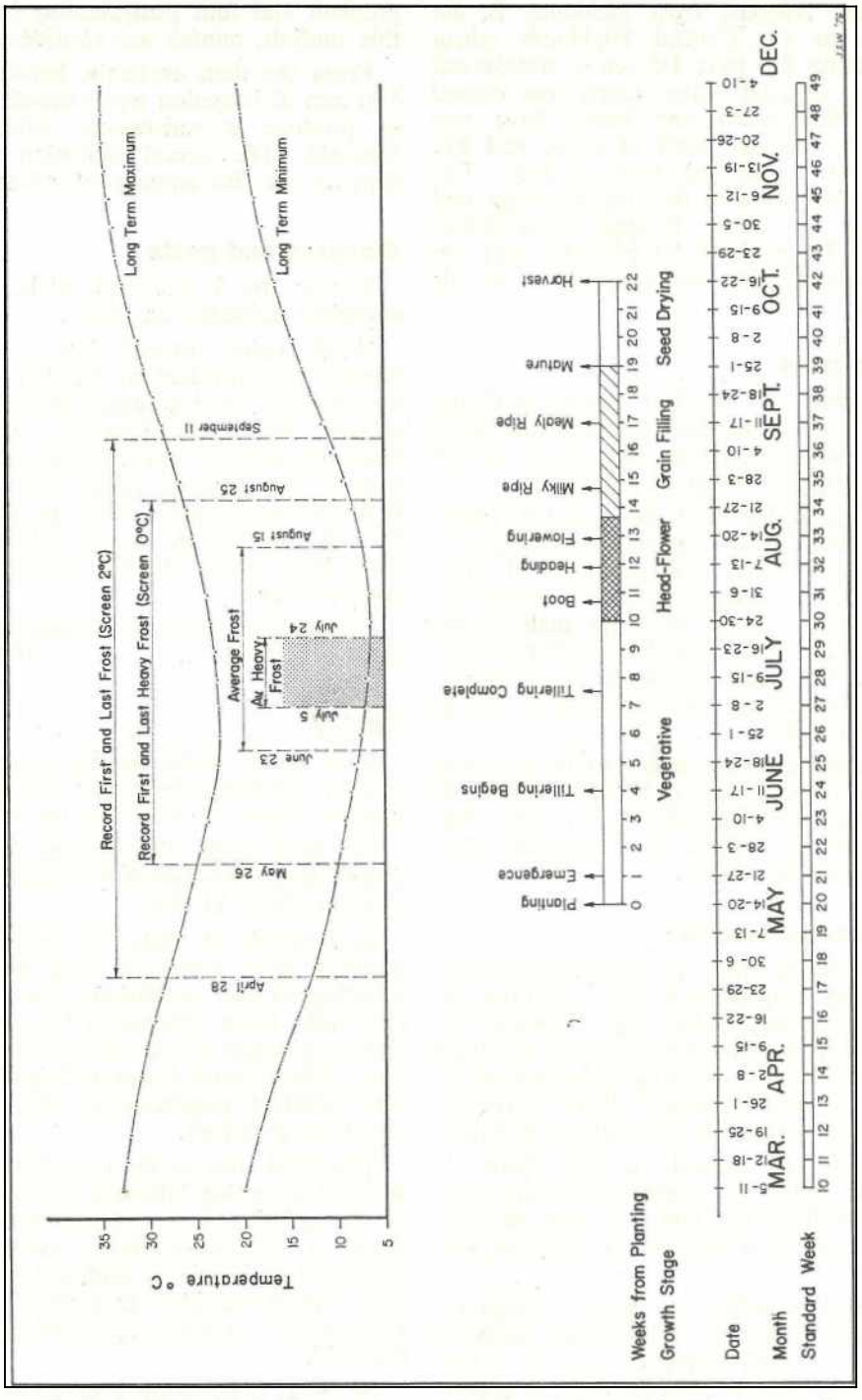


Figure 1. Growth and development of irrigated wheat at Emerald in relation to temperature and frost conditions.

In many seasons, frost incidence is not important to the Central Highlands wheat crop. During the past 10 years, widespread damage to dryland wheat crops was caused only in 1968 when one heavy frost was recorded in the last week of June, and five heavy frosts in the last week of July. The irrigated trials were in the tillering stage and no damage was done. Damage from lighter frosts can be avoided by planting only on higher ground with no restrictions to air movement.

Fertilizer rates

A number of fertilizer trials involving different rates of nitrogen as urea and phosphate as superphosphate has been carried out with irrigated wheat at Emerald.

On both soils, but particularly on the Downs soil, a marked yield response to nitrogen is only obtained when superphosphate is also applied. Without adequate superphosphate and without adequate irrigation in the early stages, yields level-off or decline above 50 to 100 kg N per ha. With adequate levels of phosphate and water, yields are still increasing at 160 to 180 kg N per ha.

Best results on both soils can be expected within the range of 22 to 38 kg P per ha in combination with 80 to 160 kg N per ha. Soil analysis can be a guide to the actual rates applied within this range.

Irrigation requirements

For the trials prior to 1974, the average post-planting irrigations totalled 233 mm in 2 to 5 irrigations, while rainfall during the growth of the crop averaged 90 mm. On both soils, a preplant or planting irrigation of at least 100 mm was necessary. This brings the average water usage for the trials to 423 mm.

Over a 4 year period on Pilot Farm 1, comparable figures for commercial crops were 262 mm of irrigation and 146 mm of rain. This amounted to a total water usage of 408 mm.

It is also possible to predict irrigation requirements from the relationship between crop water use and evaporation from a free water surface. This is explained in the appendix. The water budget for wheat at Emerald gave a total crop water use of 455 mm in one preplant and four post-planting irrigations. In this analysis, rainfall was considered negligible.

From the data available, between 400 and 500 mm of irrigation water should be required to produce a satisfactory wheat yield at Emerald. The actual irrigation requirement depends on the amount of effective rainfall.

Diseases and pests

During the 7 years of trials, rust had a negligible influence on yields.

Black point, caused by a saphrophytic fungus was prevalent in the 1971 trials. The fungus lives on dead plant material and rain splashes the spores from the soil on to the flowering parts. In 1971, 58 mm of rain falling over 4 days affected 18 to 20% of grain in WW 15 and Mendos, 11% in Timgalen and 3% in Condor. A sample with more than 10% black point can be down-graded at the receival depot.

A plague of mice also caused considerable damage in 1971.

Quality

One of the main quality criteria is grain protein. Premiums are paid for each 1% of protein above 11·5% and up to 15·5%.

On both soils, all varieties including the dwarfs and semi-dwarfs produced grain with proteins above 11·5%.

In a couple of trials, low protein and also mottling were associated with very wet and waterlogged soil conditions. On these heavy clay soils, there appears to be some suppression of nitrogen uptake under very wet conditions. The balance between irrigation practice and fertilizer requirements will need to be investigated further.

The 1974 trial on the open Downs soil was watered at weekly intervals. The protein levels of all varieties were reduced but the variety Egret, a relative of Oxley, yielded 4 914 kg per ha of grain with a protein level of 8·6%. This sample was ideal as a biscuit wheat, and there may be a potential for biscuit wheats at Emerald.

In 1971, black point lowered the quality of the grain. In some other seasons, rain on the mature grain prior to harvest caused bleaching

and weathering of some samples. Early planting helps to avoid the chance of rainfall damage to the grain as well as rainfall interference with harvesting operations.

The volume weight of all varieties exceeded the 74 kg per ha minimum necessary for the Prime Hard, No. 1 Hard and ASW classifications.

Recommendations

Variety—Oxley, Kite, Timgalen (in that order).

Planting Date—Mid April to mid May.

Seeding Rate—60 kg per ha.

Fertilizer—80 to 160 kg N per ha, 22 to 38 kg P per ha.

Irrigation

A preplant or planting irrigation plus 3 to 4 irrigations of 75 to 90 mm each during the growing period should be necessary. If three irrigations are given, these could best coincide with the mid tillering, boot-flower and grain filling stages of growth. If four irrigations are supplied, they should coincide with the mid tillering, boot, flowering, and grain filling stages.

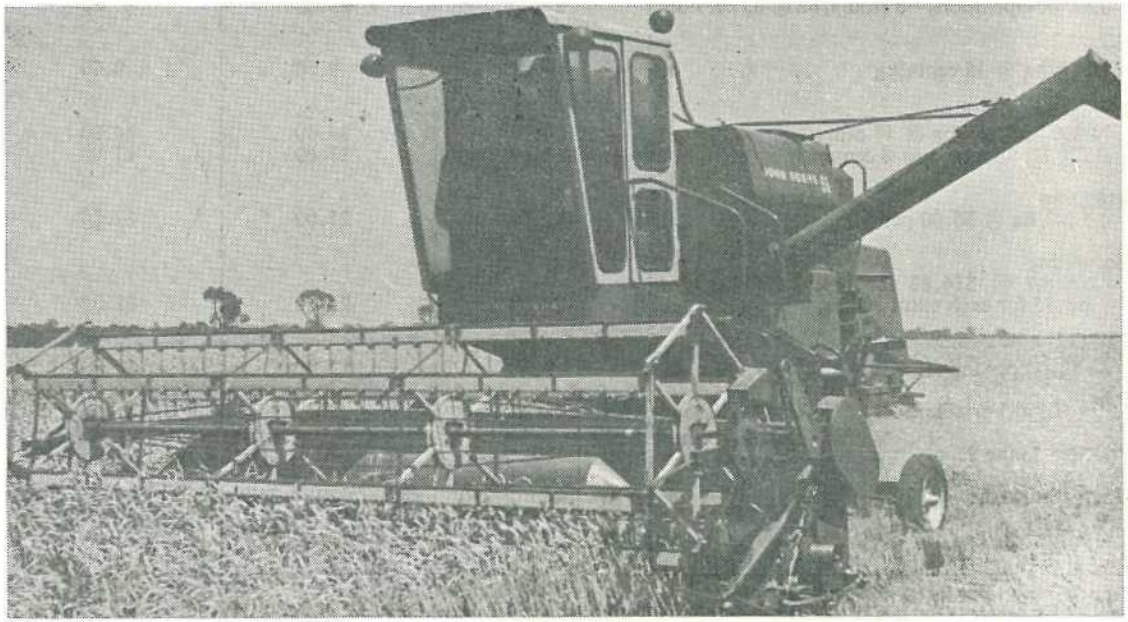
In many years, an irrigation is required at an early tillering stage to promote secondary root development and good vegetative growth of the crop. The shallow, open Downs soil may require more frequent irrigation. The semi-dwarfs like Oxley and Kite can respond to extra irrigations.

Economics

The gross margins given in table 1, are based largely on data collected from irrigated crops of commercial wheat grown on Pilot Farm 1 at Emerald. Three yield levels and three grain prices are considered. Varieties such as Oxley and Kite should be capable of producing commercial yields in excess of 4 000 kg per ha. The only extra costs involved in producing these higher yields are those associated with harvesting and cartage. These high-yielding varieties make wheat an attractive winter crop in irrigation areas.

Acknowledgement

The author acknowledges the information provided by other officers of the Department in the compilation of this article. Mr. A. S. Greasley, Agriculture Branch, assisted in the preparation of the final draft.



Harvesting irrigated wheat—Pilot Farm 1, Emerald. Early planting helps to avoid rainfall interference with harvesting operations.

Appendix

Wheat irrigation requirements related to evaporation from a free water surface—water budgeting

The rate of evaporation from a free water surface is related to the supply of radiant energy from the sun. As a result, evaporation is higher during summer than winter (figure 2A).

A well-watered plant can be likened to a wick evaporating water from a reservoir—the soil. As the surface area of the plant increases, the rate of water loss also increases. At full development, a crop is evaporating water at a rate approaching the evaporation from a free water surface. (Shown in figure 2B by the dotted line).

The stepped solid line of figure 2B approximates the relationship between the two rates of water loss as a ratio. The ratio increases from 0·4 in weeks 1 to 4 from planting to 0·9 in weeks 8 to 13 from planting.

The information in figures 2A and 2B can be used to estimate or predict how much water the crop is using. This is illustrated in the figure for a wheat crop planted from May 14 to 20.

During the week of planting, class A pan evaporation is 3·8 mm per day. The crop evaporates water at 0·4 of this rate (that is, 1·52 mm per day), so that by the end of the first week, 1·52 x 7 or 10·6 mm of water is used.

The accumulated weekly crop water use to the nearest 5 mm is plotted in figure 2C. Irrigation is applied when the cumulative total exceeds 75 mm. After 6 weeks, the crop has used 80 mm so this amount is applied as irrigation to replenish the soil moisture reservoir.

TABLE 1

GROSS MARGINS IRRIGATED WHEAT

Yields kg/ha	3000			4000			5000		
Variable Costs									
Tractor Operations—8 Hours/ha @ $3 per hour	24.00			24.00			24.00		
Seed									
60 kg/ha @ 15 cents/kg	9.00			9.00			9.00		
Fertilizer									
N 200 kg Urea/ha @ 17 cents/kg	34.00			34.00			34.00		
P 220 kg Super/ha @ 8 cents/kg	17.60			17.60			17.60		
Irrigation									
4·5 Ml/ha @ $6.00 per Ml	27.00			27.00			27.00		
Harvesting									
Contract @ $14.82 for first 2 000 kg plus $2.75 for each extra 500 kg	20.32			25.82			31.32		
Cartage									
@ $3.00 per tonne	9.00			12.00			15.00		
Total Variable Cost		140.92			149.42			157.92	
Price per tonne $	70	80	90	70	80	90	70	80	90
Gross Return/ha	210	240	270	280	320	360	350	400	450
Gross Margin/ha	69	99	129	131	171	211	192	242	292

Price per tonne is after deducting rail freight.

The tractor hours include all land preparation, furrowing, fertilizing and planting operations. This will vary with type of tractor and implements. The $3.00 per hour rate is to cover fuel, oils and maintenance.

NOTE: 1 Ml/ha is equivalent to 100 mm depth of water. Cartage is calculated on the basis of $2 per tonne plus 10 cents per kilometre per tonne assuming that the property is 10 kilometres from the Emerald receival depot.

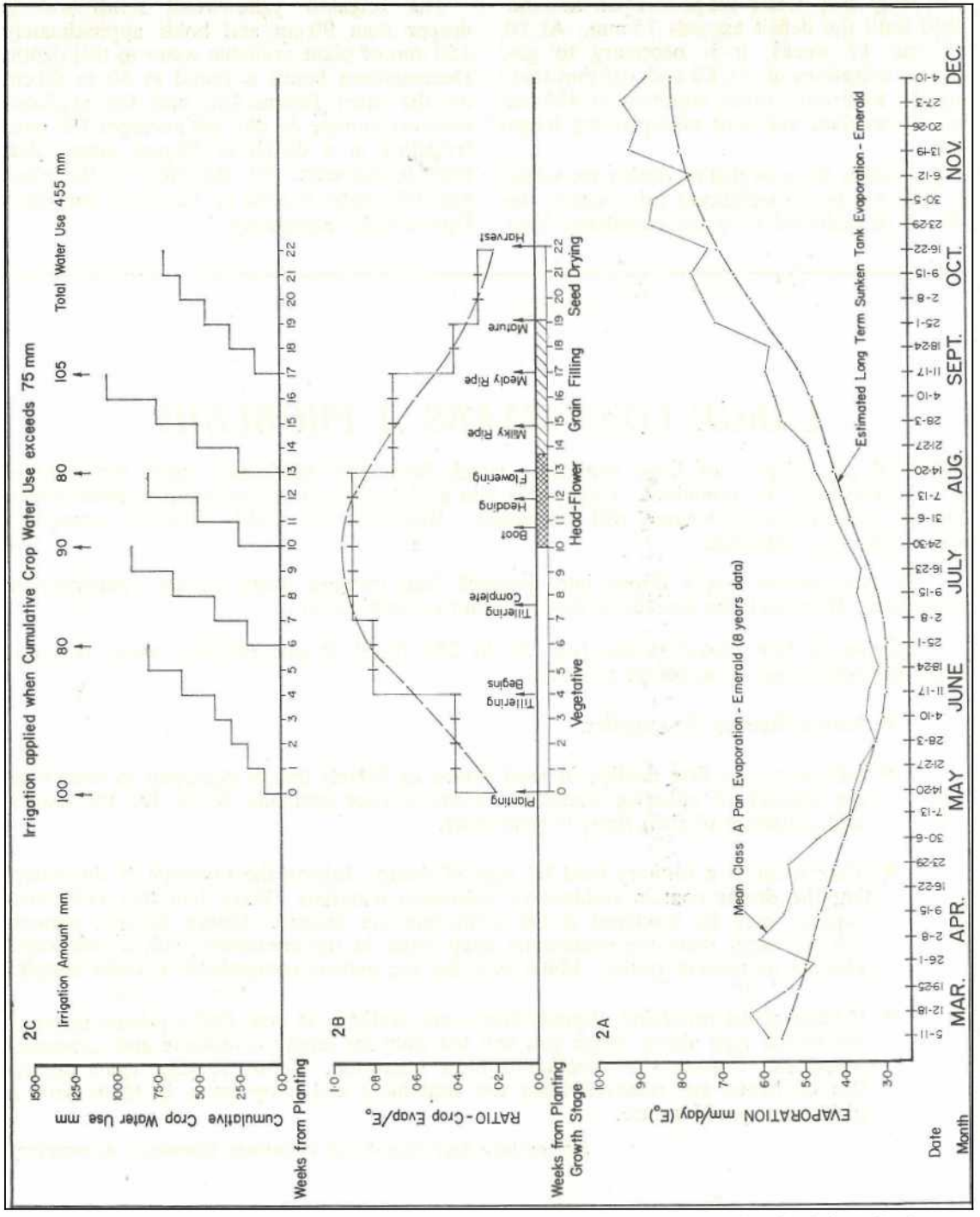


Figure 2. The relationship between crop water use and class A pan evaporation in irrigated wheat at Emerald.

Weekly crop water usage is again accumulated until the deficit exceeds 75 mm. At 10, 13 and 17 weeks, it is necessary to give further irrigations of 90, 80 and 105 mm making the total crop water requirement 455 mm in one preplant and four post-planting irrigations.

Rainfall is often negligible during the winter at Emerald but if significant rain occurs, this should be deducted from the cumulative total.

The brigalow yellowwood scrub soil is deeper than 90 cm and holds approximately 150 mm of plant available water to this depth. Decomposing basalt is found at 60 to 90 cm on the open Downs soil and the available moisture storage on this soil averages 125 mm. Irrigating at a deficit of 75 mm means that prior to irrigation, 50 and 60% of the plant available water is used on the scrub and open Downs soils respectively.

LARGE CONTAINERS A PROBLEM?

BEFORE you dispose of large containers which have held pesticides, check for remains of any material in the container. Empty this into a pit on the container site in a place where contamination of water sources will not occur. Remember to double rinse the containers with water after emptying.

Do not convert empty drums into livestock feed troughs, water storage containers or raft floats. They could be sources of food or water contamination.

Dispose of large metal drums (e.g. 50 to 250 litres) in one of these ways. (Do not forget to double rinse them before return.)

- Return them to the supplier.
- Sell them to a firm dealing in used drums or barrels that is equipped to neutralise the toxicity of adhering materials. Contact your pesticide dealer for the names and addresses of such firms in your state.
- Take them to a sanitary land fill type of dump. Inform the operator of the dump that the drums contain residues of poisonous materials. Warn him that poisonous vapours may be produced if the containers are burned. Before leaving, remove lids or bungs from the containers; chop holes in the containers with a sharpened pickaxe to prevent re-use. Make sure the site cannot contaminate a water supply.
- If none of the preceding disposal means are available to you, find a private disposal site of the type above which you will use only for empty containers and unwanted pesticides. Correct site selection is most important. Before leaving, again ensure lids or bungs are removed from the containers and chop holes in them with a pickaxe to avoid re-use.

By courtesy Agricultural and Veterinary Chemicals Association.

The Tea-trees of South-eastern Queensland

TEA-TREES are shrubs or trees belonging to the genus *Melaleuca.* This name is derived from two Greek words *melas* meaning black and *leukos* meaning white.

The trunk of the first tree described was black and its branches were white. The explanation is that both trunk and branches were probably white originally, but the trunk had been charred by a bushfire. This gave it a black appearance. With very few exceptions, species of this genus are found only in Australia; the majority coming from Western Australia.

They are always shrubs or trees and their leaves are usually alternate. Only a small proportion have opposite leaves. The leaf margins are always entire, and the leaves are usually flat; more rarely they are semi-terete. The texture of the flat leaves can be leathery, and up to five or seven prominent longitudinal veins can be present.

The foliage contains an abundance of aromatic, essential oil. In some of the taller paper-barks, this has been exploited commercially for its high germicidal value. Most tea-trees have thick bark made up of many papery layers which can be peeled off in sheets. Aboriginal women are said to have used this bark to wrap their children in.

The flowers are massed together in either oblong cylindrical spikes or globular heads. There is often a tuft of leaves at the top as the axis usually grows out during or just after flowering. The inflorescence can be terminal or axillary.

More rarely, the flowers are solitary and scattered. Each flower has five sepals and five petals and an ovary at the bottom containing three cells.

Melaleuca quinquenervia

The flowers differ from those of *Callistemon* in having the staminal filaments united into five distinct bundles opposite the petals. The united portions of the filaments (the claw) is usually flattened and strap-like. It can be short and broad, or very long and narrow. The free portions of the filaments are thread-like. They may be arranged only along the margins of the claw or also scattered on the inner face.

The petals and stamens are the same colour, with the stamens being the most conspicuous part of the flower. In other parts of Australia, the colour varies from white to yellow, pink and mauve to purplish-red or violet, rich red or crimson. In south-eastern Queensland the flowers are usually white or cream, only one species being mauve.

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by Beryl A. Lebler, Botany Branch.

The common name 'tea-tree' is accredited to Captain Cook who is reported to have boiled the leaves to make a liquid which he gave to his men to prevent them from suffering from scurvy.

Ten tea-trees are found in south-eastern Queensland. These are: *Melaleuca quinquenervia, M. nodosa, M. thymifolia, M. irbyana, M. linariifolia, M. styphelioides, M. decora, M. bracteata, M. groveana, and M. sieberi.*

Paper-barked tea-tree (*Melaleuca quinquenervia*).

The Latin word for five is *quinque* and the specific epithet is derived from the prominent nerves running from the base to the tip of the leaves.

DISTINGUISHING FEATURES. The broad, stiff leaves with five to seven prominent nerves together with the thick, papery bark of this shrub or tree are sufficient to distinguish this plant.

DESCRIPTION. This tree sometimes flowers as a shrub 1 m high, but it can grow to 25 m. The thick, whitish bark is made up of many papery layers. The crown of the tree is usually fairly dense and green, with silvery new growth.

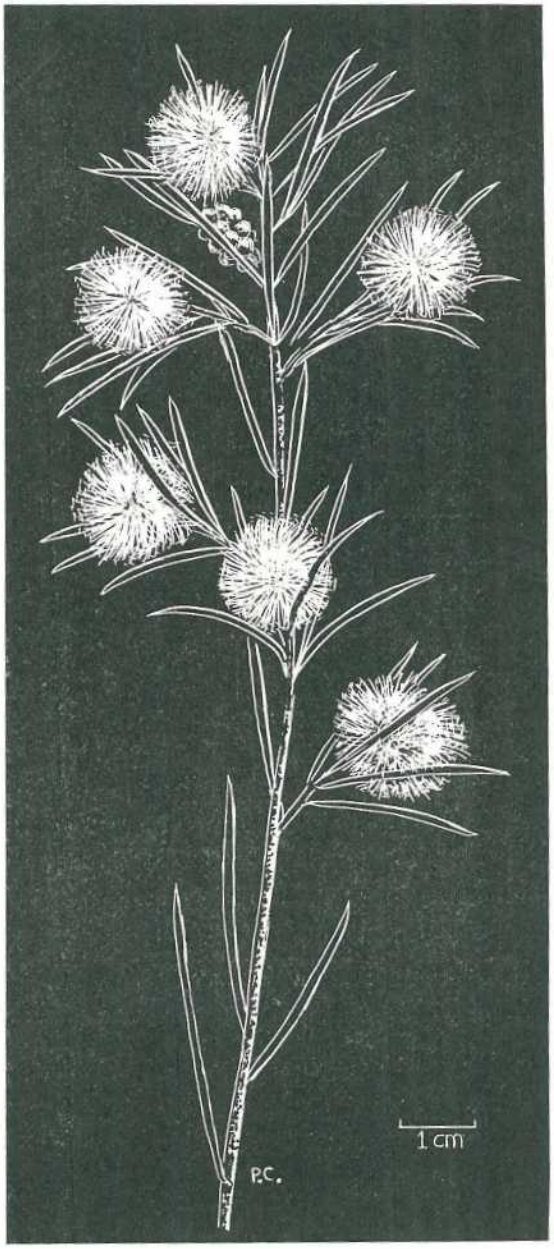
The leaves are scattered along the stems. They are dull green, stiff in texture, 5 to 9 cm long and 1 to 2·5 cm wide, narrowed to each end, and have a pointed tip. Although as many as seven veins can be found in some leaves, the usual number is five. The leaves are held out from the stem in a vertical plane.

The thick, fluffy flower spikes are 4 to 8 cm long, and half this size in width. In most trees, they are white or cream but it is reported that red or partly red flowers can be found. The spikes are terminal.

The filaments are 1·25 cm long and each ends in a small, cream anther. The cream style in the centre of the flower unfolds first when the buds open. At this stage, the filaments are still bent inwards with the anthers concealed within the flower. Before flowering is over, the spike grows out into a leafy twig. The seed capsules are crowded together and are broadly cylindrical. They have a thick wall and the valves are somewhat exserted.

FLOWERING TIME. Autumn to midwinter.

HABITAT. They usually grow in low-lying swampy ground, but are also found on slopes in forest country where the ground water is close to the surface.



Melaleuca nodosa

DISTRIBUTION. This species is widely spread in coastal districts in eastern Australia. It grows from Sydney northwards to Papua and as far as New Caledonia in the east.

GENERAL REMARKS. The flowers have a rather heavy, honey-sweet perfume due to the rich store of nectar. This makes the trees particularly important to apiarists.

Prickly-leaved paperbark (*Melaleuca nodosa*)

The Latin word *nodosus* means full of knots or knotty. It refers to the manner in which the flowers are crowded together in dense, globular heads.

DISTINGUISHING FEATURES. This is the only tea-tree in south-eastern Queensland with stiff, narrow, prickly-pointed leaves and balls of creamy flowers.

DESCRIPTION. Although these plants are usually seen as shrubs they can grow to a height of 6 m. The bark is whitish and papery and the stiff, narrow leaves are arranged in a loose spiral on the stems. They are up to 3 cm long and end in a rigid, sharp point. In some areas, they are almost terete, in others, almost linear. The flowers are creamy white to a deeper yellowish colour and are crowded into balls at the ends of the branches.

The inflorescences are from 1·25 to 2·5 cm in diameter and the long, thin filaments end in deeper coloured anthers.

After flowering, the branch continues to grow so that the compact cluster of small, woody seed capsules surrounds the branch like a knotty bead.

FLOWERING TIME. Spring to summer.

HABITAT. It is widely spread in the coastal lowlands on sandy wallum flats from Port Jackson to just south of Bundaberg. It is found inland as far west as the Miles to Condamine Road in the south and the Blackdown Tableland in central Queensland.

GENERAL REMARKS. It is being cultivated successfully, the best form coming from the Sunshine Coast around Caloundra. It flowers more densely and has deeper coloured flowers.

Thyme Honey-myrtle (*Melaleuca thymifolia*)

Thyme is a European garden plant whose leaves are used in cooking. When this plant was described, a resemblance was apparently noticed between its leaves and those of thyme.

DISTINGUISHING FEATURES. This is the only species in south-eastern Queensland with mauve flowers and one of two with opposite leaves.

DESCRIPTION. This is always a shrub usually growing to a height of no more than 60 cm but occasionally reaching 90 cm to just over 1 m. The leaves are bluish-green, opposite and decussate, 0·6 to 1·2 cm long and are lanceolate to elliptic in shape. They have a blunt tip and are on a very short petiole.

The flowers are in short, axillary spikes on the wood formed in the previous year. When the flowers are fully open these are about 1 cm long and almost twice as wide. Each inflorescence consists of seven to ten flowers. These are sessile, with a smooth, green calyx 0·2 cm long, the rounded corolla lobes being as long as the tube.

The small, mauve petals curve outwards between the calyx lobes and are less than 0·3 cm long with each petal cupped around the base of the staminal bundle. The filaments are joined together to form a flat strap and the bundles are twice the length of the petals. The free portions of the filaments are arranged pinnately along the upper half of the claw and are also scattered on the inner face. The anthers are small and mauve in colour.

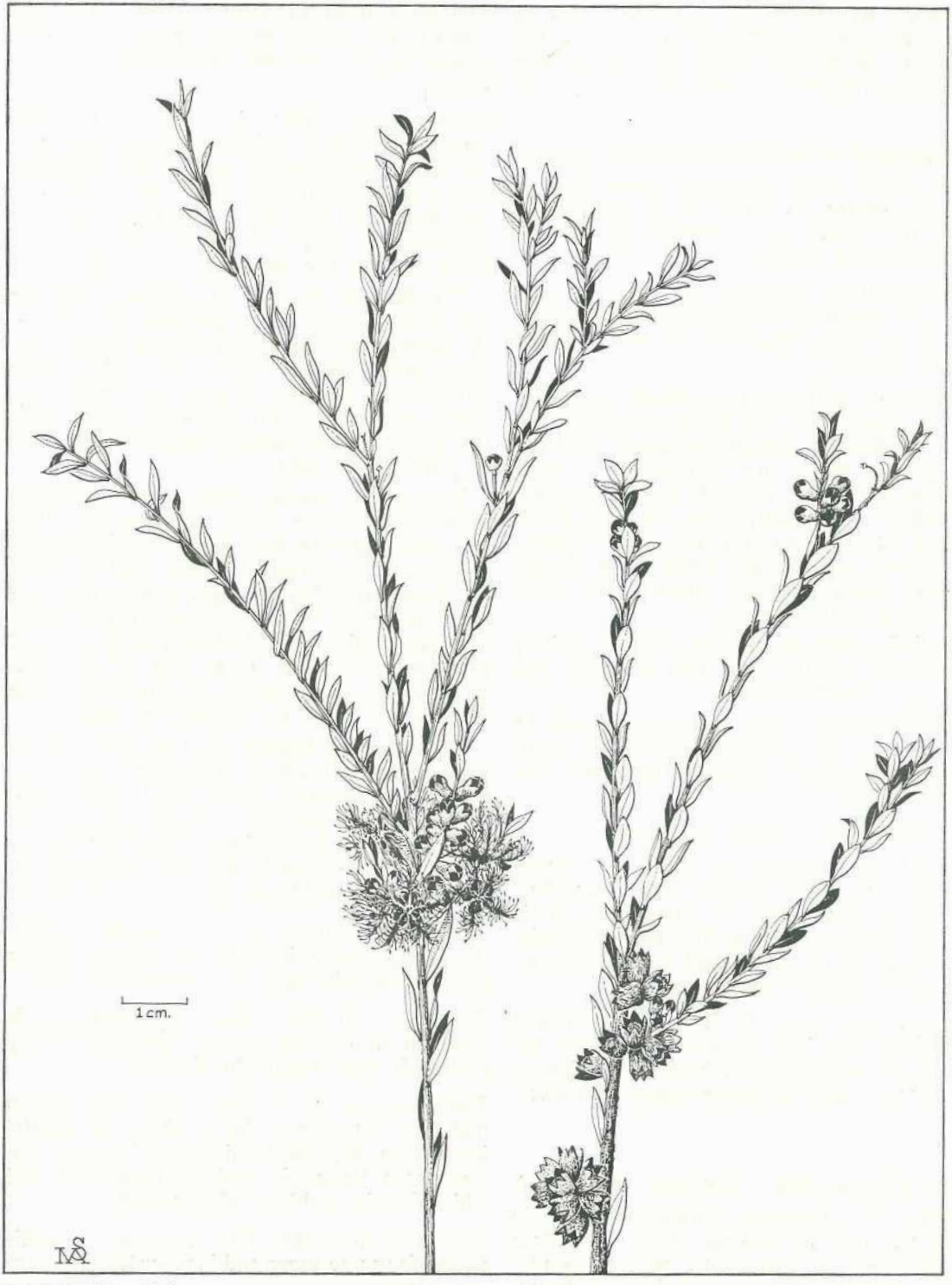
The staminal bundles give a very feathery appearance to the flower since they curve outwards and upwards. The style is thick and curves out to one side of the flower. The stigma is green and globose. The fruits are dry and brown, 0·3 cm in diameter and as deep. They are crowned by the persistent calyx lobes.

FLOWERING TIME. In the coastal regions, this shrub flowers in spring to summer. In the inland mountain areas, it flowers in autumn.

HABITAT. On the coastal lowlands, it is common in wallum swamps and in swampy ground in open eucalyptus forests.

DISTRIBUTION. It is found in the eastern mainland States to as far north on the coastal lowlands as the Elliott River and inland to the Carnarvon Range in central Queensland and Chinchilla in southern Queensland.

GENERAL REMARKS. This has been in cultivation for some years and is regarded as a very good dwarf melaleuca.



Melaleuca thymifolia

Melaleuca irbyana

This tree was named in honour of Mr. L. G. Irby, a museum collector who first discovered the plant in swamps at Casino.

DISTINGUISHING FEATURES. The shape and size of the small, imbricate leaves are all that are needed to distinguish this plant.

DESCRIPTION. This is a very attractive tree about 6 m high with a dense, rounded crown, and very slender, twiggy branchlets. The dark green, sessile leaves are 0·2 cm long and are crowded in a very tight spiral so that the tip of each leaf overlaps the level of the base of the one next to it. The leaves lie close to the stem with the tips spreading slightly from it, so that when sterile, this tea-tree resembles some of the small-leaved heaths.

The flowers are in compact spikes 1·5 cm long and a little wider. Before flowering is finished, the axis has grown out into a leafy shoot. Sometimes, this happens twice in one season so that there is one inflorescence in full bloom and another in the bud stage further up the stem.

The calyx tube is green and glabrous, about 0·1 cm long with broad, triangular calyx lobes. The petals are twice the length of the calyx and are white. The staminal bundles are 0·5 cm long and the flattened claw is scarcely longer than the petals. The spreading free filaments at the end of the claw are more than twice the length of the claw.

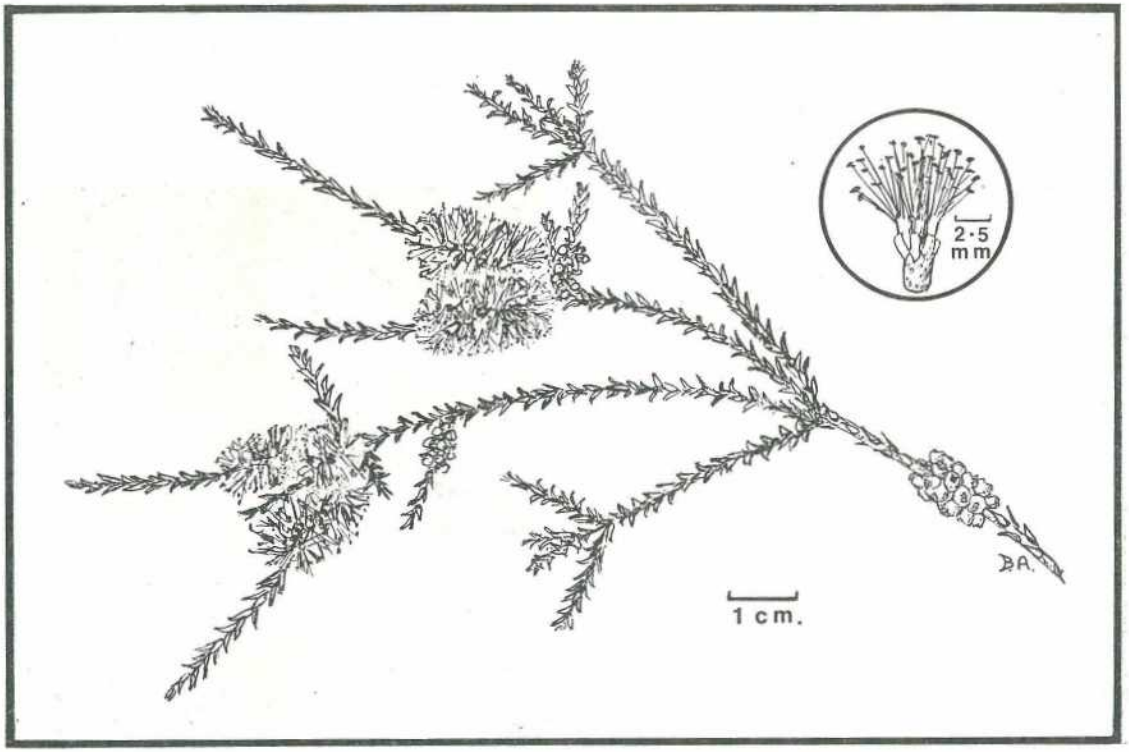
The globular fruits are the same colour as the stem and are 0·3 cm in diameter but much shallower. They are contracted at the top, sometimes with the minute calyx lobes still showing.

FLOWERING TIME. Summer.

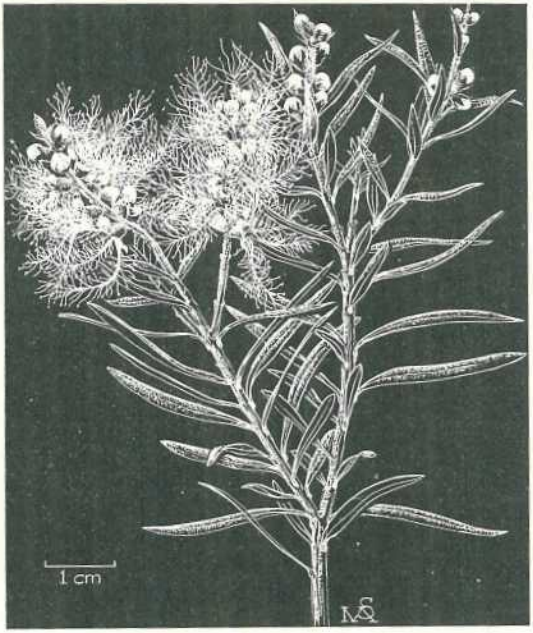
HABITAT. This tea-tree grows in heavy soils in poorly-drained flats and in or near swamps.

DISTRIBUTION. It has a very restricted distribution. It is found only in the Casino area in New South Wales and in a belt south-west of Brisbane to as far west as Gatton.

GENERAL REMARKS. This plant is now also being grown to a limited extent as an ornamental.



Melaleuca irbyana



Melaleuca linariifolia

Flax-leaved paperbark or snow in summer (*Melaleuca linariifolia*)

Linaria is a spring annual which is still grown in modern gardens much as it was in 1797, when this plant was described. Its name is derived from the Greek word *linon* which means flax, and refers to the flax-like leaves. The specific epithet of this paper-bark means leaves like Linaria and refers to the resemblance between the leaves of the two plants.

DISTINGUISHING FEATURES. The papery bark, the narrow leaves arranged in pairs and the spikes of fluffy, white flowers with very long staminal bundles are sufficient to distinguish this plant.

DESCRIPTION. This is a tree which can grow to 12 m. It has a greyish-white paper bark and a fairly dense and often rounded crown of dull green leaves. They are arranged in pairs and are about 2·5 cm long and 0·2 cm wide and are tapered to both ends. The flowers are in spikes about 4 cm long and 3 cm in diameter when the flowers are fully expanded. They are also opposite in decussate pairs and are sessile. The five cupped petals are white.

The feathery-white staminal bundles are 1 cm or more long and are the longest found in South-eastern Queensland. The claw is narrow and short. Fine filaments radiate from it in all directions, those at the end of the claw being the longest. The style is thick and white and ends in a wider, flattened stigma. The seed capsules are cup-shaped, 0·3 cm long and wide.

FLOWERING TIME. Summer.

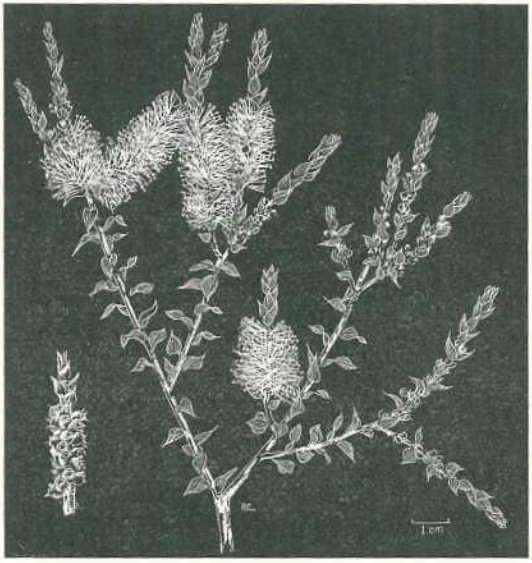
HABITAT. It is commonly found on damp, badly-drained flats, drainage lines, creek banks and alluvial flats.

DISTRIBUTION. In New South Wales it grows only as far south as Port Jackson. In Queensland, it is found State-wide.

GENERAL REMARKS. This attractive paperbark is suitable for cultivation in home gardens and has also been used in street plantings.

Prickly-leaved tea-tree (*Melaleuca styphelioides*)

The Greek suffix *oides* indicates resemblance. When this plant was described, comment was made that the habit and leaves were exactly like those of several members of the genus *Styphelia.*



Melaleuca styphelioides

DISTINGUISHING FEATURES. The pungent pointed, slightly keeled, sessile leaves and the short, dense flower spikes distinguish this tea tree.

DESCRIPTION. In some situations, this plant grows into a handsome tree 10 m high with a dense crown. In wallum areas, subject to fires, it flowers when only a shrub 1 m high. The bark is white and papery and the bright green leaves are arranged in a close spiral and curve straight out from the stem. They are finely striate with many veins, rigid and pungent-pointed, and the sides are curved. The margins appear to be entire but magnification shows they are minutely serrate. They are 1 cm long, and 0·3 cm wide.

The young twigs and the axis of the inflorescence are densely covered with silky, very short, spreading hairs. The dense, oblong or cylindrical spikes are 2·5 cm long and just under 2 cm wide. The axis grows out into a leafy shoot before flowering is finished. The calyx is pale green, 0·8 cm long and is covered with very short, white hairs. The petals are greenish-white and are twice as long as the sharply-pointed, triangular calyx lobes but are rounded and cupped. They are usually shed before the staminal bundles have begun to unfold from the bud. These are 1 cm long, with the free filaments as long as the claw. The bundles spread out around the white style.

The fruits are pale grey and are crowned by the five persistent calyx lobes. Each fruit is 0·25 cm in diameter and as long.

FLOWERING TIME. It flowers from late spring to early summer.

HABITAT. It is found on sandy soil in wallum country.

DISTRIBUTION. It grows only on the central and north coast of New South Wales and the coastal areas of Queensland to as far north as the Burrum River.

GENERAL REMARKS. The Queensland plants differ from those in New South Wales in having smaller leaves. It is popular as a cultivated plant because it is hardy and fast-growing and makes a good screen plant since it retains its growth to ground level.

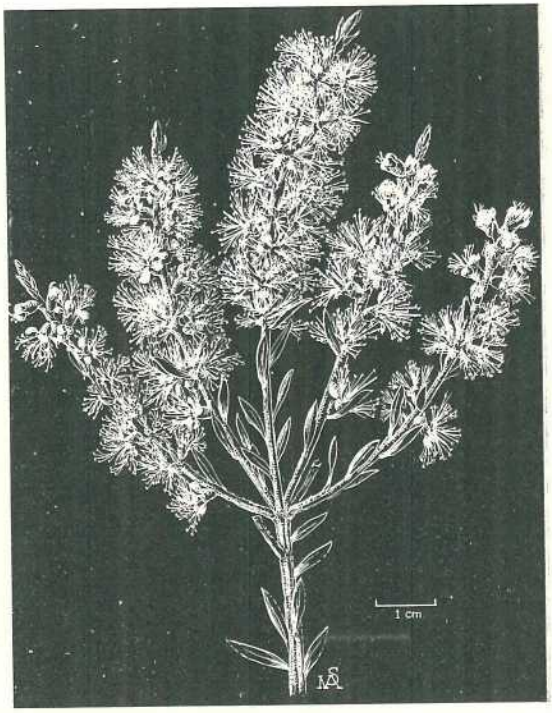
Melaleuca decora

The Latin word *decorus* can mean beautiful, handsome or decorative. Any of these adjectives could be applied to this plant.

DISTINGUISHING FEATURES. The narrow leaves, long flower spikes and hairy styles distinguish this plant.

DESCRIPTION. This shrub or bushy-headed tree grows to 15 m in height with many twiggy branches. The bark is papery and white and the leaves are bright to dark green. They are alternate and held at an angle to the stem in a vertical plane. They are never more than 1 cm long and are less than 0·2 cm wide. They are narrowed to both ends and the tip is finely pointed.

The flower spikes are from 2 to 6 cm long and 1·5 cm wide. The axis is sparsely covered with minute, white hairs and the flowers are scattered in alternate pairs or triads. Often, the flowers are in the axils of shorter, widely-spreading leaves.



Melaleuca decora

The light green calyx tube is 0·3 cm long and appears to be glabrous. Under magnification, a sparse covering of minute, white hairs can be seen on the base.

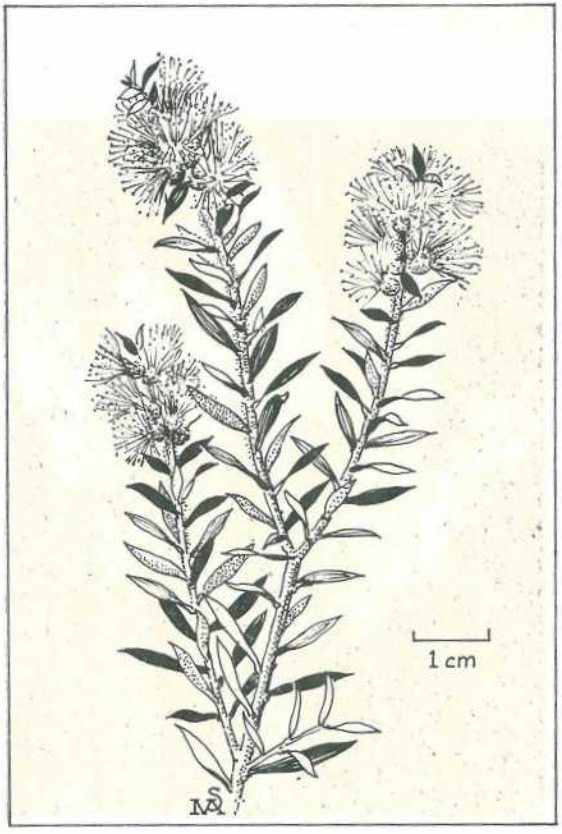
The flowers are 0·8 cm long, both the calyx and the cupped petals being 0·2 cm long and the staminal claws 0·5 cm long, with 20 to 30 filaments along the greater part of the margin.

The thick, white style is longer than the staminal bundles and has widely-spaced, very short hairs all along its length but this can be seen only under magnification.

This is the only melaleuca in south-eastern Queensland which has a hairy style. The fruits are about 0·3 cm long and as wide, with the valves deeply enclosed.

FLOWERING TIME. Summer.

HABITAT. On the coastal lowlands, it favours swampy, waterlogged areas, but inland it grows on sandy soil on creek banks.



Melaleuca bracteata

DISTRIBUTION. It is found only on the central and north coast of New South Wales and on the coastal plains in Queensland to as far north as the Burrum River and as far west as Tara on the Darling Downs.

GENERAL REMARKS. The flowers are so strongly perfumed that, in a confined space, they become objectionable.

Black tea-tree or river tea-tree (*Melaleuca bracteata*)

DISTINGUISHING FEATURES. This is the only tea-tree in south-eastern Queensland which does not have a paper-bark. Its bark is hard and furrowed.

DESCRIPTION. This can grow to a height of 20 m. The bark is dark, brownish-grey and deeply fissured. It can flake off in rather corky pieces. The linear-lanceolate leaves are alternate and sessile. They are up to 2 cm long, 0·2 cm wide, firm in texture and are close together. The tip is acutely pointed but not pungent.

The flowers are in loose terminal spikes never more than 2·5 cm long and usually with only about 20 flowers. These spikes are interrupted by floral leaves and the axis often grows out before all the buds have opened. The axis is pubescent, the hairs being very short. They can be seen only under magnification.

The calyx tube is glabrous, about 0·1 cm long and ends in five triangular lobes. In this plant, the petals are green-tinged, rounded and cupped. The petals soon fall, often before the staminal bundles are fully unfolded. The bundles are about 0·7 cm long. The claws project slightly beyond the calyx tube and then spread outwards around the style. About 24 slender, white filaments spread from the edge of the claw. The style is thick and greenish-white and ends in a flattened stigma.

FLOWERING TIME. Late spring.

HABITAT. It grows in loamy soil on creek and river banks.

DISTRIBUTION. This tea-tree is widespread throughout Queensland except in the south-west. It is also found in northern New South Wales, the Northern Territory and the northern corner of Western Australia.

GENERAL REMARKS. Two forms are being grown in gardens.

Melaleuca bracteata 'Golden Gem' is a shrub 1 to 2 m high which consistently has golden-coloured leaves when the plant is grown in full sun. The new foilage of *Melaleuca bracteata* 'Revolution Green' is bright green. When it was first released, the general height in gardens was said to be 10 to 15 feet, and it was recommended for hedge plantings because of its dense foliage.

Melaleuca groveana

This plant was first collected in 1919 from a high, volcanic ridge near Edenvale railway station in the Nanango district.

Melaleuca groveana

DISTINGUISHING FEATURES. This is the only tea-tree with leaves resembling those of callistemon. However, it differs in having two lateral veins forming an intra-marginal vein.

DESCRIPTION. This is a tree up to 5 m high, with rather close, flaky, slightly compressed, fibrous bark. This bark is light brown in colour. The leaves are bright green and, in strong sunlight, many glandular dots are easily visible both in the lamina and along the margin. The intra-marginal veins are seen most clearly at the base of the leaf.

The flowers are in terminal spikes of eight to fourteen flowers. These spikes can be 5 cm long and 3·5 cm wide. The buds are slightly flushed with pink but this colour disappears by the time the buds have opened. The green calyx tube is glabrous and the papery, brown sepals stand up from the rim of the tube between the petals. These are cupped and white and are reflexed from the base of the staminal bundles.

The stamens are up to 1 cm long. They have creamy-white filaments which end in small, yelow anthers. At their base, the filaments are united into a broad claw 0·2 cm long. The style is thick and white and usually curves slightly to one side. It ends in a slightly thicker stigma.

The fruits are orbicular, 0·7 to 0·8 cm in diameter with a slightly contracted orifice and rather deeply-sunken valves.

FLOWERING TIME. Late winter or early spring.

HABITAT. This plant grows on ridges or high mountain slopes or the summits of mountains.

DISTRIBUTION. It grows only in Queensland to as far north as Kingaroy on the coastal lowlands. It is also found on the Blackdown Table, and the Carnarvon Ranges.

Melaleuca sieberi

This tea-tree was named in honour of Franz Wilhelm Sieber, a Czechoslovakian naturalist and explorer.

DISTINGUISHING FEATURES. The short, dense spikes with densely pubescent axis and calyx tubes and a glabrous style distinguish this tea-tree.

DESCRIPTION. This is a shrub or tree which grows to 9 m high with a paper bark and a dense crown. The leaves are alternate but close together with the leaf blades in a vertical plane. They are bright green, almost 1 cm long and are speckled with translucent dots. They are tapered to both ends and are firm in texture.

The flowers are crowded in a short, dense spike at the ends of the twigs. Each flower is in the axis of a tiny, cupped, green bract which becomes brown as it ages.

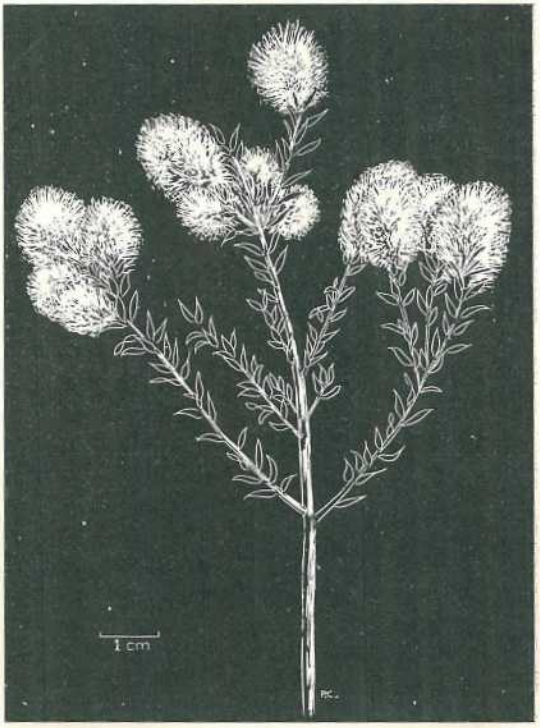
A minute fuzz of short, spreading, white hairs covers every part of the inflorescence except the petals. The buds are pink and the petals of mature flowers are white. The flowers are heavily scented. The staminal filaments are fine and white and the anthers are lemon in colour.

The fruits are more or less cup-shaped and the persistent sepals curve inwards.

FLOWERING TIME. Spring.

HABITAT. It grows in Wallum-type communities usually in wet conditions or swamps.

DISTRIBUTION. It is found only in New South Wales and Queensland from as far south as Port Jackson to Tewantin in the north.



Melaleuca sieberi

Field Key to *Melaleuca* in south-east Queensland

1.	Leaves opposite	2
	Leaves alternate	3
2.	Small shrub, flowers lavender-pink in clusters on previous year's stems. Calyx lobes persistent and thickened when in fruit	*Melaleuca thymifolia*
	Tree with whitish papery bark, flowers white, in terminal spikes. Fruits cup-shaped	*Melaleuca linariifolia*
3.	Bark hard and furrowed	*Melaleuca bracteata*
	Bark in papery layers	4
4.	Leaves linear or needle-like, rigid, pungent-pointed. Flowers cream, in dense globular or ovoid axillary or terminal heads	*Melaleuca nodosa*
	Leaves not needle-like or linear. Flowers in cylindrical spikes	5
5.	Leaves 5–9 cm long, elliptical or lanceolate, usually with 5, 3 or 7 nerves. Flowers usually white or creamy white; very rarely red or partly red. Fruit broadly cylindrical with a thick wall and somewhat exserted valves	*Melaleuca quinquenervia*
	Leaves less than 5 cm long	6

6. Leaves much less than 0·5 cm long, imbricate, concave and broad above base, erect or slightly spreading in upper portion; flower spikes up to 2 cm long .. .. *Melaleuca irbyana*

Leaves 0·5 cm or more long 7

7. Leaves pungent pointed, ovate or ovate-lanceolate, to 1·25 cm long, finely striate with many nerves; Calyces and floral axis pubescent .. .. *Melaleuca styphelioides*

Leaves not pungent pointed, linear lanceolate or lanceolate 8

8. Leaves 2·5 to 5 cm long, tri-nerved, the two lateral veins forming an intra-marginal vein. Spikes terminal, 2 cm long, about 2 to 3 cm wide; calyx glabrous .. .. *Melaleuca groveana*

Leaves less than 2 cm long 9

9. Leaves more or less twisted, 0·5 cm or more long. Spike dense, up to 2 cm long; calyces and floral axis densely-pubescent, style glabrous .. .. *Melaleuca sieberi*

Leaves straight, about 1 cm long. Spike sometimes interrupted and leaf 2 to 6 cm long. Calyx more or less pubescent in lower part, glabrous above; style pubescent .. .. .. *Melaleuca decora*

Stable fly bites production

by L. N. Corbet, Veterinary Services Branch and J. W. Turner, Entomology Branch.

THE constant irritation and injury to which cattle are subjected by an outbreak of stable fly spells disaster for efficient production.

Animals stamp and switch continually in an attampt to dislodge the insects. They huddle in groups and cease feeding.

An individual may be subjected to thousands of bites each day. This results in the loss of hair and the exposure of raw flesh especially on the legs and shoulders. Some of these areas develop secondary infections with pungent discharges.

Breeding cycle

The stable fly closely resembles a housefly and only a close examination will reveal that the mouth parts are adapted for blood sucking. The flies breed in decaying organic matter. Higher nitrogen levels favour breeding so that straw contaminated by animal wastes or peanut shell which contains kernel, provide better breeding sites than plain straw. Unlike the bush fly, this insect is not able to breed in dung alone.

Hot, wet conditions favour breeding. Rapid build-up of populations occur as the fly is theoretically capable of increasing 500 fold every 3 weeks. Within a short period from when suitable food becomes available, population outbreaks can occur. As the flies often move up to 6 km from the original breeding site, the effect of an outbreak can be felt over a wide area.

Breeding sites

While stable flies are always present in many areas of Queensland during summer, severe outbreaks are fortunately rare. These are normally caused by some human activity such as spreading peanut shell or other organic matter without incorporating in the soil, heaping up straw or hay and leaving it to decompose, slashing tall grasses and leaving it lie or the inefficient disposal of stable wastes. If this type of practice is avoided, stable flies will rarely be a problem.

Treatment and control

When an outbreak occurs, quick action is essential to avoid production losses. Short term relief can be obtained by using smoke-pots to provide shelter for stock while pyrethrum will repel flies for 1 or 2 days when sprayed on the animals.

Another approach to management of the problem is to kill flies by use of a residual chemical applied to the stock.

An effective chemical to use is iodofenphos (registered trade mark—Nuvanol N). A mixture of 5 g of this product with 500 ml of water applied to an adult animal gives a quick knock-down of flies and will give cattle relief for up to 2 weeks.

The above measures can be further reinforced by an attack on the breeding sites.

Diazinon used at the rate of 100 to 200 litres per hectare of 0·1% active constituent and applied as a coarse, high pressure spray so as to force entry into the trash, acts as a larvacide. This will also control many adults visiting the area to lay eggs.

Management is the key to solving this problem. Unless food is provided, the problem will not occur. Rapid application of protective measures if the flies are detected will prevent unnecessary distress to animals and losses to stock owners.

Navy bean fertilizer recommendations for the South Burnett

NAVY Beans in the South Burnett are mainly grown as dryland crops on friable soil types. Some localities appear to be more favoured for rain than others and, from these areas, crop failures are rare.

The soils used for navy beans are scrub or forest types frequently slightly acid. They are very often low in phosphorus and nitrogen. If originally forest soils, potash is often very low or a potash deficiency may develop after these soils have been cropped for a few years.

The navy bean plant may be expected to mature in 12 to 16 weeks from planting. The short term nature of the crop together with the relatively shallow root system means that soil moisture and nutrients need to be readily available to produce a good crop.

Navy beans are legumes and often show root nodules. However, trials have shown no reliable or regular yield increases from Rhizobial inoculation. Fertilizer nitrogen should therefore be used where soil nitrogen is low.

Navy beans respond best to fertilizers applied as bands at seed level and 3 to 5 cm to the side. Care should be taken that neither nitrogen nor potash fertilizer comes into contact with the seed. Superphosphate may be banded with the seed without causing damage.

Seed beds should not be disturbed by fertilizer tines as this will cause poor emergence. If fertilizers are placed too far away from seed, the plants are slow to develop and as a result there may be an increase in seedling deaths due to fungal diseases.

by J. H. Saint-Smith, Agriculture Branch.

Phosphorus

Lack of adequate phosphorus is the most common cause of poor plant growth in the South Burnett. Seedlings lack vigour, are dark green in colour, mature late and only carry a very small crop. Apparently healthy, well-grown crops may also respond to added phosphates. Trials have shown that responses still occur at a soil test of 60 p.p.m. P.

Application rates of up to 50 kg per ha P (500 kg per ha superphosphate) have given responses in trials under favourable weather conditions.

Such a high rate as that suggested has given residual responses in both sorghum and peanuts. On five trials in 1976, the best economic rate on soils varying from 10 to 55 p.p.m. available phosphorus was 40 kg per ha P.

Potassium

Navy beans respond to adequate soil potash. Deficiency symptoms are a marginal scorch on the lower leaves and depressed yields. Where soil tests show very low potash or where deficiency symptoms have been observed, potash should be applied at up to 50 kg K per ha (104 kg sulphate of potash per ha). Residual effects from application of potash to navy beans have been observed in yields of following sorghum and peanut crops. It is preferable to apply sulphate of potash rather than muriate of potash because navy beans are susceptible to excess chlorides.

Nitrogen

Nitrogen deficiency in navy beans is shown by pale green lower leaves. The whole plant may be affected if the deficiency is severe. This would be accompanied by a reduced number of pods and a lower yield.

It is necessary to correct phosphorus and potash deficiencies before any real response will result from nitrogen applications. Plants may then respond to applications at planting times of banded nitrogen at up to 40 kg per ha N for dry land crops.

For irrigated crops, much higher rates of nitrogen may be used—up to 100 kg per ha.

Zinc

Navy beans are susceptible to zinc deficiency, particularly if grown on alkaline clay soils. However, on the acid red loams of the South Burnett, zinc deficiency is seldom of much importance.

Slight visual symptoms as shown by green leaf veins with brown to yellow interveinal areas may be observed without a marked yield reduction.

If treatment is considered necessary a suitable spray per hectare is: 1 kg zinc sulphate, 1 kg urea and a non-ionic wetting agent to 100 litres water, to be applied at 2 to 3 weeks and at 4 to 5 weeks after emergence.

Wambo Shire Handbook available

A 146 page Handbook documenting the agricultural production and resources of the Wambo Shire on the Darling Downs, has been published by the Department of Primary Industries.

The Handbook reviews the environmental and natural resources which affect farm production and the people of the Shire.

Climate, topography, water resources, soils and vegetation are described, farming systems discussed, animal and crop production reviewed and yields and turnoff quantified.

The economics of the farming industries of the Shire also are studied.

The Minister for Primary Industries, Mr. V. B. Sullivan, said that the Handbook provided important reference material, including maps and statistical tables, for all concerned with the rural industries of the Wambo Shire.

(The Shire is located within the Minister's electorate of Condamine).

"The Shire Handbook will serve as a guide to farmers and graziers, bankers, stock and station agents and other businessmen involved in rural enterprises", he stated. "It also will be a useful reference for students at all educational levels and provide essential information to regional planners".

Mr. Sullivan said the Wambo Shire Handbook was the first of a new series of Shire Handbooks to be produced by officers of his Department.

The major agricultural Shires would be covered in the series and a number already were in an advanced stage of preparation.

He added that the Wambo Shire Handbook could be obtained by writing to the Director-General, Department of Primary Industries, Brisbane, and enclosing $11, which will include postage and handling charges.

Alternatively, those interested could call at the Department's office in William Street, Brisbane.

Oats Varieties for 1977

Compiled by S. R. Walsh, Agriculture Branch.

IN Queensland, oats are sown mainly for grazing. Less than 12% of the area is given over to seed, hay and silage production.

The main oats plantings are south of the Tropic of Capricorn.

Oats are usually classified according to their rate of growth as either quick-growing or slow. The following table provides details of the characteristics of a number of oats varieties.

The varieties Bentland and Minhafer are examples of quick-growing types which have an erect plant habit, and a high, early growth rate. These often present grazing management problems under normal seasonal conditions.

Algerian and Camellia, on the other hand, have a slower growth rate and are semi-prostrate in habit. They are usually easier to manage in a forage programme than the quick-growing types.

It is anticipated that Stout, an erect growing, crown-rust resistant variety will be released for the coming season. However, seed supplies are very limited.

Where seed of a recommended variety is unavailable, farmers should contact their local Department of Primary Industries' office or consult the table of oats varietal characteristics to determine a useful alternative.

Other crops which should be considered for grazing are canary, wheat and barley.

For late planting in July and August, barley may give faster grazing and higher grazing yields than oats and should be considered.

Fertilizer recommendations and further information should be obtained from your local D.P.I. officer.

DISTRICT RECOMMENDATIONS

District (Shires)	Planting Months	Varieties	Planting Rates (kg/ha)
North Queensland			
Townsville, Ayr, Dalrymple, Bowen	IRRIGATED April–May	Camellia, Saia	50–60 (Saia lower rate)
Capricornia			
Broadsound, Calliope, Fitzroy, Livingstone, Mirani, Nebo, Pioneer, Proserpine, Sarina	March–April April–May	Camellia Bentland, Minhafer	40–50
Banana, Duaringa	GRAZING Late Feb.–June	Camellia, Algerian, Minhafer, Bentland	25–50
	HAY April–June	Minhafer, Bentland	25–50
Bauhinia, Belyando, Emerald, Peak Downs	February March–June	Algerian Algerian, Camellia	20–40 20–40

DISTRICT RECOMMENDATIONS—*continued*

District (Shires)	Planting Months	Varieties	Planting Rates (kg/ha)
Burnett			
Biggenden, Gayndah, Mundubbera, Perry, Eidsvold, Monto	Feb.–April March–June	Camellia, Algerian Minhafer, Saia, Bentland	30–50
Gooburrum, Isis, Kolan, Miriam Vale, Woongarra, Burrum, Woocoo (limited application)	March–June	Minhafer, Saia, Bentland	30–50
South Burnett			
Kilkivan (part), Kingaroy, Murgon, Nanango, Wondai, Rosalie (Cooyar only)	Feb.–June March–June	Camellia, Algerian, Minhafer	40–50
Near North Coast			
Landsborough, Noosa, Maroochy, Widgee, Tiaro, Kilkivan (part)	March–June	Saia, Bentland, Minhafer, Camellia, Algerian	40–60 (Rain-grown) 50–90 (Irrigated and sod-seeded)
East Moreton			
Caboolture, Pine Rivers, Albert, Beaudesert	April–May	Minhafer, Camellia, Algerian	40–60 (Rain-grown)
	June	Saia, Bentland, Minhafer	50–90 (Irrigated and sod-seeded)
West Moreton			
Kilcoy, Esk, Gatton, Laidley, Moreton, Boonah	March–April	Minhafer, Algerian, Camellia	40–60 (Rain-grown)
	May	Saia, Minhafer	50–90 (Irrigated and sod-seeded)
Darling Downs			
Chinchilla	Feb.–March	Algerian, Camellia	25–35
	March–June	Minhafer, Garry, Camellia	25–40
Wambo	March–June	Algerian, Minhafer, Camellia, Garry	25–40
Crow's Nest, Jondaryan, Pittsworth, Rosalie, Millmerran (east of Condamine River)	Feb.–March	Algerian, Camellia	35–45
	March–June	Minhafer, Garry, Camellia	35–45
	July	Garry	35–45
Millmerran (west of Condamine River)	Feb.–March	Algerian, Camellia	25–35
	March–June	Minhafer, Camellia	25–40
Clifton, Allora, Glengallan, Rosenthal (River alluvial soils)	Feb.–March	Algerian, Camellia (Rodney in selected areas)	35–45
	March–June	Minhafer, Camellia, Garry	35–45
Stanthorpe, Rosenthal (Traprock and Granite soils)	Feb.-March	Algerian, Saia, Rodney	25–35
	March–June	Saia, Minhafer	25–35
Inglewood	Feb.–March	Algerian, Camellia	30–40
	March–June	Minhafer, Camellia	30–40
	Darling Downs Irrigation—Sowing rate increased to		**50–60**
Near South-west			
Tara, Murilla, Taroom	March–June	Camellia	25–30
	April–June	Minhafer, Bentland	
Bendemere, Bungil, Warroo, Booringa	GRAZING March–July	Minhafer, Garry, Camellia, Algerian	20–25
	HAY April–June	Minhafer, Bentland	20–25
Balonne, Waggamba	GRAZING March–July	Minhafer, Bentland, Camellia	20–25 (30–35 late planting)
	HAY April–June	Minhafer, Bentland	20–25 (30–35 late planting)

CHARACTERISTICS OF OATS VARIETIES

Variety	Growth to Flowering	Early Plant Habit	Growth to First Grazing	Frost Tolerance	Rust Resistance		Seed Colour	Awns	Tillering Ability	Grain Yield
					Crown	Stem				
Recommended Varieties										
Algerian ..	Sl	Prostrate	Sl	Good	S	S	Brown	Fine X	Good	Fair
Bentland ..	Med–Sl	Erect	Q	Fair	S	S	Yellow	Few Fine	Fair	Fair
Camellia	Med–Sl	Semi-prost.	Med–Sl	V. good	S	V.S.	Yellow	Few Fine	Good	Fair
Garry ..	Sl	Semi-erect	Q	Fair	Mod. R.	Mod. R.	Yellow	Few strong*	Fair	Fair
Minhafer ..	Med–Sl	Erect	Q	Fair	Mod. R.	Mod. R.	Cream	Few strong	Fair	Fair
Rodney ..	V. Sl	Erect	Q	Fair	S	S	Cream	Few strong*	Fair	Fair
Saia	Med–Sl	Semi-erect	Med	Poor	S	V.S.	Black	Med	Fair	Poor
Others may be sown when seed of above not available										
Avon ..	Med	Erect	Med	Poor	S	V.S.	Cream	Nil	Poor	Poor
Belar ..	Med	Semi-erect	Med	Fair	S	S	Lt. Brown	Strong*	Good	Good
Benton ..	Med–Sl	Erect	Q	Fair	S	S	Yellow	Fine	Fair	Fair
Cooba ..	Sl	Prostrate	Sl	V. good	V.S.	S	Lt. Brown	Nil	V. good	V. good
Coolabah ..	Med	Semi-erect	Med	Good	V.S.	S	Cream	Strong*	Good	Fair
Fulghum ..	Q–med	Semi-erect	Med	Good	V.S.	S	Lt. Brown	Nil	Fair	Good
Klein ..	Sl	Prostrate	Sl	V. good	S	S	Lt. Brown	Fine X	V. good	Fair
Lampton ..	Sl	Semi-erect	Med	Poor	S	S	Lt. Brown	Strong	Fair	Fair
Landhafer ..	V. Sl	Semi-prost.	Med	Good	S	S	Brown	Fine X	Good	Fair

Sl. = Slow; Med = Medium; Q = Quick; V.Sl. = Very slow; S. = Susceptible; V.S. = Very susceptible; R. = Resistant; Mod. R. = Moderately resistant; X = Awns on both grains; * Strong awns indicated by twisted black base.

Wheat and barley planting guide for 1977

Compiled by S. R. Walsh, Agriculture Branch.

TIMGALEN, Gatcher, Oxley, Kite and Songlen are the grain varieties recommended for 1977.

Except for Oxley all these varieties possess effective resistance to stem rust.

A low level of a new race of stem rust was found in a few very late crops of Oxley during the 1976 season. Songlen is resistant to leaf rust while Oxley has a useful level of resistance in the field. The other varieties are susceptible to leaf rust.

Hopps, a dual purpose variety, has adult plant resistance to stem rust and is recommended for certain situations.

It should be noted that Timgalen, Gatcher, Oxley and Songlen may be classified Prime Hard while Kite and Hopps are restricted to the No. 1 Hard Classification.

The semi-dwarf characteristic of Kite, Songlen and Oxley can be associated with poor plant emergence if deep planting is practised.

The recommendations are based on trial results, field performance and susceptibility to disease.

Varieties are listed in the table in order of preference.

Quick-maturing varieties

Gatcher is a quick-maturing, awned variety of medium height which produces good quality grain. It is the most widely grown variety and has performed well in trials and in commercial production in most regions. However, it appears more subject to nutritional disorders than other varieties and therefore is not recommended for some soils of the plains area of the Darling Downs. Gatcher appears more susceptible to yellow spot than other recommended varieties. Some plants in Gatcher may be susceptible to a new stem rust race.

Timgalen is a medium-early, awned variety of medium height with strong tillering characteristics. The variety has good grain quality.

Kite is a semi-dwarf, tip-awned variety relatively new in Queensland. It is highly resistant to stem rust but susceptible to leaf rust and has yielded well in trials to date. Kite is harder to thresh than Mendos which it may replace to some extent in the more western areas where an awnless variety may be grazed in the event of a crop failure. Kite has certain quality defects and is not accepted into Prime Hard classification.

Songlen is a new, quick-maturing, semi-dwarf wheat released by the University of Sydney. It is an awned variety very similar in general appearance to Timgalen (one of its parents) but has improved resistance to both stem and leaf rust. To date, the yield performance has averaged about the same as Timgalen and Gatcher. The quality of Songlen appears to be at least equal to that of Timgalen.

Mid season varieties

Mid-season varieties are recommended on a more restricted basis than the quick-maturing varieties. They are intended for planting early when suitable rains occur. Except in very reliable districts, or under irrigation, their performance may be poor when sown late. For 1977, only one mid-season variety, Oxley, is recommended.

Oxley is a semi-dwarf, awned variety of high yield potential. Under mild conditions in the month after planting, Oxley will behave as a mid season variety, but if cold conditions are experienced early in crop growth, it may act as a quick-maturing type with maturity similar to Timgalen.

Oxley is intended mainly for planting in late May and June on the Darling Downs. It may be sown somewhat earlier in the more northern and inland areas, but it is definitely not suitable for late sowing in these districts.

Oxley is now susceptible to stem rust and some modification of planting strategy may be necessary particularly on the Darling Downs.

It is very desirable that a number of varieties be planted on any particular farm.

Where it was intended to plant a large proportion of the wheat acreage to Oxley, it would be preferable if some was replaced with a stem rust resistant variety such as Kite.

Late planting of Oxley should be avoided in all districts.

The variety **Timson** is a new, bearded, semi-dwarf wheat bred by the University of Sydney Plant Breeding Institute. However, seed supply of this variety in 1977 is expected to be strictly limited. There is no point, therefore, in including Timson among the recommended varieties for 1977.

In Departmental tests, Timson has not yielded as well as Oxley. On the other hand, it is resistant to stem and leaf rusts. This is most important for Queensland conditions. Testing of the variety continued in 1976 in Queensland to provide further information which can be used to make a decision on whether to recommend Timson in future seasons.

Grain classifications

Premiums for Prime Hard quality will be paid by the State Wheat Board only on the following varieties:

Gamut
Gatcher
Mendos
Oxley
Songlen
Spica
Timgalen

Grain from the following varieties is acceptable only as No. 1 Hard or lower grades:

Festiguay
Hopps
Kite
Tarsa

Barley

In Queensland, Barley is grown principally on the Darling Downs, Moreton, Burnett, and parts of the Capricornia and Near South-west regions for grain or for grazing.

About 230 000 hectares were grown in 1976 for an expected yield of about 370 000 tonnes.

Clipper is the only barley variety which the Barley Marketing Board will accept for classification as Malt I or II. Other varieties such as Corvette, Prior, Maris Baldric, Zephyr, and Lara will only be accepted as milling classification.

Corvette was released in 1976 by the Queensland Department of Primary Industries in conjunction with the Waite Agricultural Research Institute in South Australia.

It will not be acceptable for malting and was released as a feed barley primarily for on-farm use. About 1 000 hectares were sown in 1976. Yields may be 15% to 18% higher than Clipper but the test weight is approximately 6% lower.

Corvette has also shown some promise as a grazing variety.

When sown for grain, barley is planted in the May to July period in the main areas. The earlier planting will mature in the cooler temperatures and produce a better malt quality grain. Frost is a danger with grain crops sown very early.

When planted as a grazing or dual purpose crop, barley may be sown from April to August; the late planting in August will only provide a limited quantity of forage.

Seeding rates vary with the proposed use of the crop, moisture availability, soil type, planting time and variety. Grain crops are sown at the rate of 20 to 40 kg per ha whilst grazing crops are sown at 30 to 50 kg per ha.

General

This is basic information only. Consult your District Extension Officer for more specific recommendations and fertilizer requirements.

WHEAT VARIETAL RECOMMENDATIONS—1977

Region (Shires)	Planting Time	Variety	Rate (kg/ha)
Capricornia			
Livingstone, Fitzroy, Calliope, Broadsound	May	Oxley	
	May–June	Gatcher, Timgalen, Kite, Songlen	
Nebo	mid-April–mid-May	Oxley	45–50 (heavy clays) 40–45 (light soils)
	May–June	Gatcher, Timgalen, Kite, Songlen	
Emerald, Peak Downs, Belyando, Bauhinia	RAIN-GROWN		
	mid April–mid May	Oxley	40
	May–June	Gatcher, Timgalen, Kite, Songlen	40–50 (after June 45–65)
	IRRIGATED		
	May	Oxley, Timgalen, Kite, Songlen	60–70
Banana, Duaringa Shire south of the Capricorn Highway	RAIN-GROWN		
	mid April–mid May	Oxley	25–40 (light soils)
	May–June	Gatcher, Timgalen, Kite, Songlen	35–50 (heavy soils)
	IRRIGATED		
	mid April–May	Oxley	60–70
	May–mid June	Timgalen, Kite, Songlen	60–70
	(Planting rate for	**Timgalen is 5–10 kg/ha less than other varieties)**	
Burnett			
Biggenden, Gayndah, Mundubbera, Perry, Eidsvold, Monto, Isis, Kolan, Gooburrum, Miriam Vale, Woongarra, Hervey Bay, Woocoo, Part Tiaro	late April–May	Oxley	30–60
	May–June	Gatcher, Timgalen, Kite, Songlen	30–60
South Burnett			
Kilkivan, Kingaroy, Murgon, Nanango, Wondai, Part Rosalie	mid May–mid June	Oxley	30–40
	late May–July	Timgalen, Gatcher, Kite, Songlen	30–45
Near North Coast			
Landsborough, Noosa, Part Tiaro, Maroochy, Widgee	April–May	Hopps (dual purpose)	55–65
	May–June	Timgalen, Gatcher, Kite, Songlen	45–55
East Moreton			
Caboolture, Pine Rivers, Albert, Beaudesert, Redlands	April	Hopps (grazing)	55–65
	May	Oxley, Timgalen	45–55
	May–June	Timgalen, Gatcher, Kite, Songlen, Oxley	45–55
	July	Gatcher	45–55
West Moreton			
Moreton, Esk, Gatton, Kilcoy, Laidley, Boonah	April	Hopps (grazing)	55–65
	May	Oxley, Timgalen	45–55
	May–June	Timgalen, Gatcher, Kite, Songlen, Oxley	45–55
	July	Gatcher	45–55

Region (Shires)	Planting Time	Variety	Rate (kg/ha)
Darling Downs		NOTE.—(Gatcher is not recommended on some soils on the plains)	
Chinchilla, Wambo	May–early June	Oxley	25–35
	May–July	Timgalen, Gatcher, Kite, Songlen	25–35
Part Rosalie, Pittsworth, Crow's Nest, Millmerran, Jondaryan	late May–June	Oxley	30–45
	June–July	Timgalen, Gatcher, Kite, Songlen	30–45 60–70 (irrigated)
Clifton, Allora, Glengallan, Rosenthal, Cambooya	late May–June	Oxley	30–45
	June–July	Timgalen, Gatcher, Kite, Songlen	30–45
Inglewood	late April–May	Oxley	30–40
	late May–July	Gatcher, Timgalen, Kite, Songlen	30–40 60–70 (irrigated)
Near South-west			
Murilla, Tara, Taroom	late April–mid May only	Oxley	15–25
	mid May–June	Gatcher, Timgalen, Kite, Songlen	20–30
	For July sowing	..	30–35
Bendemere, Booringa, Bungil, Warroo	late April–mid May only	Oxley	15–25
	mid May–June	Gatcher, Kite, Songlen	20–30
	For July sowing	..	30–35
Waggamba	RAIN-GROWN		
	late April–mid May only	Oxley	15–25
	mid May–June	Gatcher, Timgalen, Kite, Songlen	20–30
	For July sowing	..	30–35
	IRRIGATED		
	May	Oxley	60–70
	mid May–June	Timgalen, Songlen, Kite	60–70
Balonne	RAIN-GROWN		
	late April–mid May	Gatcher, Timgalen, Kite, Songlen	20–30
	For July sowing	..	30–35
	IRRIGATED		
	May	Oxley	60–70
	mid May–June	Timgalen, Songlen, Kite	60–70

Seed viability maintained in seed stored underground

by J. F. BOURNE, Extension Officer, Goondiwindi.

The results of germination tests on underground grain stored in the Talwood district show that seed viability can be maintained for several years. Dry storage conditions appear to be the critical factor.

UNDER these conditions, underground pits have a dual purpose role of storing grain for both fodder and seed.

Storage of loose grain in underground pits has been carried out on a number of properties in the near south west region of Queensland. This is a cheap, practical way of storing grain as a fodder reserve for droughts.

During 1975, grain samples taken from pits in the Talwood district, 100 km west of Goondiwindi, showed an unexpectedly high germination when tested. These results indicate that underground pits can also be used as an alternative method of storing seed.

The pit

In October, 1971, a 22 t pit was dug by Messrs. J. and K. Montgomery on "Fairymount", in the Talwood district. The pit was lined with 0·05 mm polythene sheeting and filled with Cape barley.

The pit was dug with a crawler tractor using rear mounted rippers. The whole operation, including excavation, lining and filling was carried out by two men in half a day.

The pit was 10 m long, 5 m wide and 2 m deep at the base of the ramp formed at each end. The pit was covered with 30 to 40 cm of soil when full.

The grain

Samples of the barley were taken in April 1975 and tested for germination at the Department of Primary Industries Laboratory in Brisbane. The result: 97% *after* 3½ *years underground!*

The grain was subsequently sown at 25 kg/ha and a good strike obtained. Growing conditions experienced on the property during 1975 were good and the crop was estimated to yield 1·5 t/ha.

Two other pits were also opened at Talwood in 1975. These were put down by Messrs. M. and B. Webster on "Harmar", and contained Cape and Clipper barley respectively.

Germination and moisture content

Germination and also moisture content were determined for all samples, and the results are shown in Table 1.

Moisture content important

The moisture content needed for long term sealed storage, as in an underground pit, is difficult to pin point exactly. However, seed viability can be maintained if the seed is kept very dry.

No measurements of moisture content were made when the grain was originally stored. However, the barley stored at "Fairymount" was noted as being a particularly dry sample. In normal farming practice, this would indicate a moisture content of 8 to 10%.

An underground pit in the Talwood district. Note the lining of polythene sheeting, prior to filling with grain.

Filling an underground pit by augering direct from a field bin.

TABLE 1

GERMINATION AND MOISTURE CONTENT OF GRAIN STORED UNDERGROUND

Location	Grain	Period of Storage	Germination	Moisture Content
			%	%
Fairymount	Cape Barley	3½ years	97	10·3
Harmar	Clipper Barley	2 years	97	10·2
Harmar	Cape Barley	1 year	98	10·8

Storage conditions

The experience of these particular underground pits suggests that the grain must be dry (at least as low as 10%) when it is put into storage if seed viability is to be maintained and in addition the grain mass should be proctected from the entry of moisture during the storage period.

It is common practice in storing grain underground to choose a well-drained site. In the Talwood district, the major soil type is a deep red lateritic earth, which forms an ideal water shedding surface. The polythene lining prevents any localised seepage into the pit.

Control of insect pests

An important advantage of underground storage is the effective control of grain insect pests without the need to rely on chemical control. The grain weevil and other insect pests of stored grain are unable to survive in underground storages because of the exclusion of air.

No insect pests were found in these pits. In other cases in the near south west region, live weevils present at storage have not survived 12 months underground.

Costs

The costs of three alternative types of storages are compared in Table 2.

In addition to the excavation cost of 45c per cubic metre, the cost of polythene sheeting is 0·1c per cubic metre.

Emptying pits

When emptying underground storages, the whole pit should be emptied at the same time. Grain from a partly opened pit can be damaged by weather.

Underground pits must be associated with above ground storage. The above ground storage capacity should be slightly in excess of the capacity of each underground pit. A new pit can then be opened, emptied and stored when grain in the above ground storage gets low.

Summarizing, the advantages of storing grain underground are the low overall cost and the cheap, effective, non-chemical control of insect pests.

TABLE 2

ALTERNATIVE STORAGE COSTS

Type	Cost/m^{-3}	Comments
	$	
Steel Silo	5.10	(not including cost of insect control)
Weldmesh Silo	0.95	(not including cost of insect control)
Underground Pit	0.45	(no insect control required)

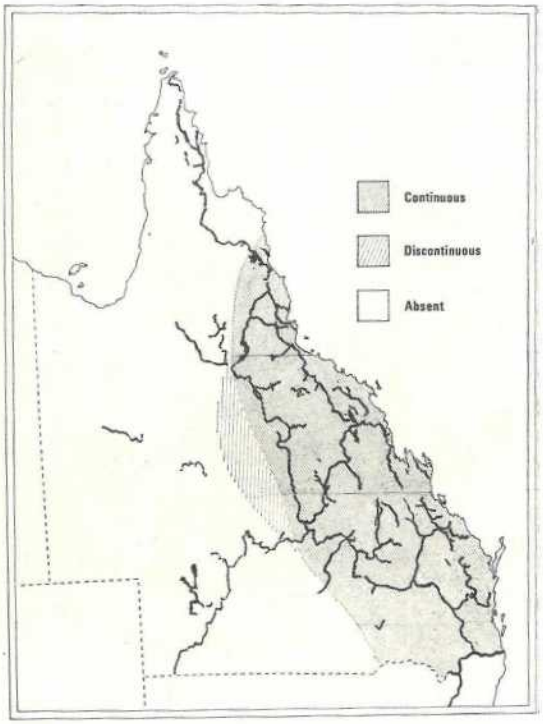
An adult rufous rat-kangaroo. Note the grizzled appearance and the characteristic stance of these small macropodids.

Rufous rat-kangaroo in Queensland

by P. M. Johnson and I. R. Bradshaw, National Parks and Wildlife Service of Queensland.

THE rufous rat-kangaroo *(Aepyprymnus rufescens* (Gray)), sometimes called 'kangaroo-rat', is one of the smaller nocturnal members of the macropodid family. There is a significant difference in the average sizes of the sexes, the female being larger than the male; adult females weigh up to 3·5 kg and males to 3·0 kg.

A rufous rat-kangaroo resting in its grass nest built over a shallow depression in the ground.



Present distribution of the rufous rat-kangaroo in Queensland.

There is no difference in the colouration between the sexes. Both are pale brown intermingled with silver-white hairs giving a grizzled appearance. The muzzle is haired and the backs of the ears also are covered with fine hairs, in the latter instance of dark colour. The terminal third of the tail is paler also and this is particularly pronounced in pouch young. The underside of the body of all individuals is white and the claws of the forelegs are well developed. These claws are used for digging up plant foods in the forms of roots and tubers.

The rufous rat-kangaroo has the same grizzled appearance, especially by night, as the spectacled hare-wallaby (*Lagorchestes conspicillatus* (Gould)) that occupies similar habitat. The latter is larger, however, and has rich brown-coloured eye-rings.

Distribution

The rufous rat-kangaroo is presently found only in Queensland and New South Wales. In Queensland, the species inhabits the eastern slopes of the ranges from the north-eastern New South Wales border to Cooktown.

Habitat types

The rufous rat-kangaroo rests during the day in a nest of dried grass built as a shallow depression in tall grass or at the base of a large tussock. Because of these nest-building habits, requirements for suitable habitat range through tall, open forest with grass understorey to hummock grassland. Although the species does not occur in tall, closed forest (rain forest), it is frequently found in the marginal areas of these. Dry periods may cause the species to congregate and agricultural crops are invaded at these times.

Breeding

Enclosure studies indicate that breeding takes place throughout the year. Females commence reproducing at 10 months of age and thereafter give birth to young at 119-day intervals throughout life. The time from mating to birth, provided no young is in the pouch, ranges from 22 to 24 days.

Birth is generally followed immediately by mating and the resulting embryo ceases development at an early stage. This quiescent (delayed) embryo resumes development if the first young is lost from the pouch. Birth occurs some 19 days after this loss. For a normal full-term pouch life, the quiescent embryo resumes development to be born when the first pouch young is some 4 months old and about to be evicted from the pouch.

General notes

The rufous rat-kangaroo is essentially a solitary animal, with adult animals usually being found alone. The only obvious associations are between the females and the young at foot, this relationship lasting until the young is weaned; and between male and female during mating.

One animal generally occupies a nest and the occupation of one particular nest is usually of short duration. Nests are often re-used. Disturbance of the animal from the nest results in the abandonment of that nest. Land clearing and natural predators are probably the main factors which substantially affect the longevity of the rufous rat-kangaroo.

Conservation

Under current legislation, the rufous rat-kangaroo is protected. It has no economic value to either the pet-meat or fur trades and hunting pressure is thus minimal. Although the species is common in Queensland, its range in Australia has been slowly diminishing since European settlement.

With continued land development, land management practices should be closely scrutinized to ensure the survival of this peculiar native fauna.

Sale of cattle from T.B. infected properties

CATTLE originating from T.B. infected properties can be sold for immediate slaughter from recognised saleyards throughout Queensland under conditions which will safeguard large areas of the State now free of tuberculosis disease.

Announcing this, the Minister for Primary Industries, Mr. V. B. Sullivan, said that the national T.B. eradication programme was a large and expensive undertaking.

It was essential that disease-free areas be fully protected against re-introduction of infection.

For this reason, a large protected area has been declared and tight controls implemented on movement of cattle into, and within, the area.

Mr. Sullivan said that the conditions which would apply to slaughter cattle originating from infected herds were:—

- They be marked with a distinctive paint mark before sale by the owner, or agent.
- Be penned and sold in a segregated portion of the saleyard.
- Be isolated from tested, or clean, cattle.
- Be conveyed by road, or rail, transport into, and or through, the protected area.

Mr. Sullivan added that this privilege would be withdrawn from those infected properties which had not established an approved eradication programme by 1st January, 1978.

Brucellosis-Tested Swine Herds (As at 7 October 1976)

Aboriginal & Island Affairs Dept., Cherbourg.	L.W.
Barrier Reef Islands Pty. Ltd., Hayman Island.	L., L.W.
Batterham, P. & N., Raby Park, Inglewood.	L., L.W.
Bertolotti, F. E. J. & N. I., Mascotte, Wallumbilla.	L.
Bool, R. A. & B. E., Rossvale, Crows Nest.	L.W., L.
Briskey, R. G. & M. J., Wallingford, Pittsworth.	L.W.
Brosnan, D. J., Bettafield, Mt. Murchison, via Biloela.	L., L.W.
Cauley, J. R., Kulpi, Postal M.S. 918, Toowoomba.	L., L.W. Stud. Com
Clegg, J. A. & M. A., Karoma Stud, Mundubbera.	L.W., L.
Coleman, C. J., Merriland Stud, Britannia Station, Charters Towers.	L., L. W.
Corney, F. D. & E. C. W., Pagel, Tara	L.W.
Cotter, N. J., Olaroy, Goomeri.	L.W.
Craig, K. F., 'Echoes', Bancroft, via Monto.	L.W.
Crawley, R. H., Rockthorpe, Linthorpe.	B.
Dean, G. F. & A. M., Home Creek, Wooroolin.	L.W., L., B.
Diete, E., 'Ettrock', Ingoldsby.	L., L.W.
Douglas, Mrs. W. S. & Son, Greylight, Goombungee.	W.
Duncan, C. P. & B. J., Colley, Flagstone Cr., Helidon.	L.W.
Duncan, J. A. & B. L., Ma Ma Creek.	L.W.
Duckett, R. & L. M., Fairview, Capella.	L., L.W.
Dunlop, B. R., c/- Dunlop Meats Pty. Ltd., 8 Malkara St., Townsville.	L., L.W.
Eagle, D. R. & J. A., 'Walugra', 134 Hogg St., Toowoomba.	L.W.
Fisher, J. & L., 'Lyndhurst', Jimbour.	L., L.W.
Fletcher, L., Par-en-eri, P.O. Box 143, Mundubbera.	L.W., L.
Fowler, K. J. & B. D., Kenstan, M.S. 195, Pittsworth.	L.W., L.
Fowler, K. P., Northlea Stud Farm, Hogg Street, P.S. 1436, Toowoomba.	L.W., L.
Fowler, N. E. P. & M. P., c/- Kewpie Enterprises, Kingaroy.	L., L.W., X
Franke, K. H. & B. Delvue, Cawdor.	L.W.
Freeman, W. A., Trevlac, Rosewood.	L.W.
Geysing, E. F. & N. E., Oakhurst, via Maryborough.	L.W.
Gosdon, T. G. & E. A., Naumia, Dalby.	L., L.W.
Graham, T., 'Dunleigh', Highfields.	L.W., L.
Greyson, D. G., Wodalla, Killarney.	L., L.W.
Grundy, A. H. & R. N., Markwell Piggeries, M.S. 499, Toowoomba.	L.W., L.
Handley, G. R., Locklyn Stud, Lockyer.	B.
Handley, Mrs. M., Meadow Vale, Lockyer.	B.
Head, G. A., East Greenmount.	L.W.
Hinchliffe, D. F. & R. K., Oakview, Milman, via Rockhampton.	L., L.W.
H.M. State Farm, Numinbah.	B., L.W.
H.M. State Farm, Palen Creek.	B.
Hudson, R. F. & V. D., Rondel, Hogg St., Wilsonton.	L., L.W.
Jones, K. B. & I. R., 'Cefn', M.S. 544, Clifton.	L.W., L.
Kajewski, C. & D. I., Glenroy, Glencoe, via Toowoomba.	L.W., L.
Kanowski, A. R., Exton, Rechey.	L.W.
Kanowski, S. E., Miecho, Pinelands.	T.
Kimber, C. F., M.S. 698, Biggenden.	L.
Kimber, E. R., Tarella, M.S. 805, Mundubbera.	L.W., B.
Kruger, V. F. & B. L., 'Greyhurst', Goombungee.	L.W.
Kuhl, V. & C. A., 'The Mounts', Boodua, M.S. 222, Oakey.	L.W.
Law, R. R. & L. M., 'Summerset', M.S. 757, Kingaroy.	L.W., L.
Le Gros, W., Elourea Large White Stud, Mt. Tarampa, via Lowood.	L.W.
Ludwig, A. L., Beau View, Cryna, via Beaudesert.	B.
Maranoa Stud Piggery, Mitchell.	L., L.W.
Marsden, M. G. & H. C., 'Fernflat', Canaga, via Chinchilla.	L.W., L.
Mathieson, K., Ideraway, Gayndah.	L.W.
Neuendorf, W., M.S. 794, Kalbar.	B.
Peters, L. A., Moonlight, Bongeen.	L.
Qld. Agricultural College, Lawes.	B., L.W.
Radel, R. M., 'Turua Stud', Biggenden.	L.
Radel, V. V., Braedella, Coalstoun Lakes	L.W.
Research Station, Biloela.	L.W.
Research Station, Hermitage.	B.
Robin, A. B., Blaxland Road, Dalby.	L.W., L.
Rosenblatt, G., Rosevilla, Biloela.	L., L.W.
Ruge, A. F. & V. M., 'Alvir' Stud, Biggenden.	L.W., L.
Ruge, G. H. & I. E., Al-lester L. W. Stud, Woowoonga, via Biggenden.	L.W.
Sharp, D. W. & L. J., 'Arolla', Lavella, via Millmerran.	L.W., L.
Smith, N. O. & G. A., 'Miandetta', M.S. 162, Warwick.	X
Smyth, R. A. H. & T. N., Barambah Rd., Goomeri.	L.W.
Trout, L. B. & L. J., 'Caminda', Crawford, via Kingaroy.	L., B.
Ward, R. J., 'The Plateau', Mulgildie.	L.W.
Wearmouth Piggeries, c/- G. Varidel, Dalby.	X
Westbrook Training Centre, Westbrook.	B.
Willett, L. J., Wongalea, Irvingdale, M.S. 232, Bowenville.	L.W., L.
Williamson, K., Cattermul Av., Kalkie, Bundaberg.	L.W., L.

KEY

Large White = L.W.	Tamworth = T.
Landrace = L.	Wessex = W.
Berkshire = B.	Crossbreed = X.

Brucellosis Accredited Free Cattle Herds

De Landelles, L., 'Cherokee', Tanby, via Yeppoon.	Brahman
Wilson, R. S., Calliope Station, Gladstone.	Hereford

THE FARM FAMILY

CANCER—most curable of all chronic diseases

CANCER has become one of the most curable of all chronic diseases. The cure rate is improving daily.

But detecting it begins with you. You owe it to yourself to know what signs to look for.

The signs are:

- Any unusual bleeding or discharge.
- A lump or thickening in the breast or elsewhere.
- A sore that does not heal.
- A marked change in bowel or bladder habits.
- Persistent hoarseness or cough.
- Persistent indigestion, difficulty in swallowing or loss of weight.
- A change in a wart or mole.

These signs are not positive proof of cancer, but it is in everyone's interest to see a doctor if any one of them should appear.

The current cancer campaign is aimed at dispelling fears and developing an awareness of the warning signs. Also, it is designed to encourage people to seek prompt medical attention for any suspicious symptoms.

Cancer, no doubt, is probably one of the most misunderstood diseases plagueing mankind.

Cervix Cancer

Smear tests conducted at Brisbane's Royal Women's Hospital reveal that cancer of the cervix appears to be more common among younger women.

It is still not certain why this is so. However, doctors can predict those women who are likely to develop it and provide treatment.

The test, which involves a vaginal examination, is painless and usually does not take more than one or two minutes. It is wise for women over 21 to have the test done.

Doctors believe this test should be performed annually when a check can be also be made of the breasts, blood pressure and urine.

One satisfactory test does not mean the woman will not develop cancer in the womb in the future. Women can have the test done in their doctor's surgery.

If cervical cancer is diagnosed, the doctor can then make arrangements for the patient to receive free treatment at the Queensland Radium Institute.

Cancer of the cervix is the third most dangerous form of cancer in women.

Skin Cancer

Sunshine is good for children and adults. But go easy on it. Over-exposure can lay the foundations of skin damage which may develop into skin cancer later in life.

One in every three Queenslanders will develop skin cancer in his or her lifetime, yet most can be prevented.

Skin cancer is a malignant change in the skin, which if unchecked, can lead to disfigurement and death.

It may take the form of certain types of moles or warts, or it may be a simple sore that fails to heal. Fair-skinned people are particularly prone to skin cancer. This is usually the result of years of exposure to strong sunlight.

You can guard against it by:

- Restricted sun-bathing and not sun-baking.
- Using sun-shades and wearing sensible clothes when at the beach.
- Making full use of sunburn protectives and sun filter creams.
- Wearing a shady, wide-brimmed hat and long-sleeved garments if you have to go out in the sun frequently for long periods.

You can prevent other forms of skin cancer by:

- Shaving carefully to avoid injury to any scaly patches or moles on the face.
- Watching any skin blemishes or moles which may be subject to constant irritation or friction from clothing.

With a mole, one of the most definite signs of danger is the appearance of a dull, brownish zone spreading from it.

Flat, 'crusty' warts that do not disappear like ordinary warts, but slowly increase, should be carefully investigated.

Weight Watchers

FEW people are overweight due to glandular trouble. Most are because of an unsatisfactory diet plan. But even for the few people with glandular trouble, something can be done about it.

The delicate, sweet flavour of most fruits should be a good choice as between-meal snacks for weight-watchers.

Contrary to general belief, banana is not taboo . . . if its calory content is always taken into consideration and balanced out with other items of diet.

In an average balanced diet, there is usually no room for more than three to four "pieces of fruit" during the day. That includes the fruit in fruit juices as well. Fruits and their juices are a major source of vitamin C in a balanced diet.

"One piece of fruit" means one medium size apple, orange, or pear, one small banana, three apricots and a small bunch of grapes or cherries. Individually, each contains an average of 60 calories.

Excess weight puts an added burden on the heart and legs and means more work for the lungs and digestive system. Over-weight people are more prone to diabetes, gout, cardio-vascular and gall-bladder disorders.

Eating more food than is necessary increases weight and as weight grows obesity develops.

Many adults are able to keep constant weight without effort, but others eat too much and put on weight for varying reasons.

Some people put on weight when they are worried. They eat to relieve their feelings. Some eat to compensate emotionally for a feeling of insecurity, frustration or lack of affection. Another cause is not enough exercise.

The only long term solution is a well-balanced diet. Any diet that deviates too much from the individual's own food habits and routine has little lasting value.

This is because as the initial enthusiasm wanes, the individual tends to revert to his old ways and soon puts on weight that was lost.

A dietary plan should ensure that the weight-watcher has food necessary for good health and also provides the basis on which the weight may be maintained at a desirable level.

For good health, the body needs building material to repair and replace tissues and also to give high resistance to disease and promote a prompt recovery from illness.

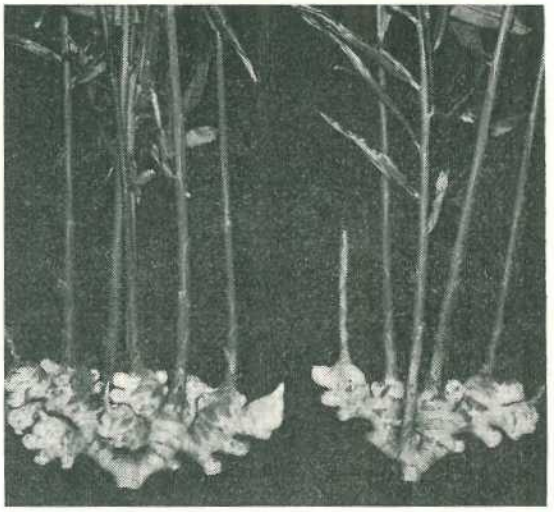
Lean meats, fish or poultry are necessary to maintain good health. It is essential to ensure that all fat is drained and no thickening is used for the gravy.

Most vegetables, boiled or raw, are low in calories. However, potato, sweet potato, corn, parsnips or baked beans should be consumed in small servings only.

From the Queensland Health Education Council.

Growing ginger in the home garden

by Officers of Horticulture Branch



GINGER is a versatile spice as it can be used green, grated into stews and casseroles, dried and ground, and used in curries.

It can also be syruped to give delicious confectionery products such as preserved ginger. In addition, ginger makes delicious jam.

To produce good quality ginger, cultural practices, time of planting and harvesting are fairly exacting.

The garden soil should be loose and friable, offering minimum resistance to the development of the ginger rhizome. Good drainage is important as the plant will not tolerate waterlogging.

The garden bed should receive the maximum amount of sunlight and be sheltered from hot, drying winds.

Preparing the bed

The garden bed should be prepared in winter. Well-rotted animal or poultry manure, if available, is very beneficial and should be incorporated during the preparation of the bed.

An application of lime or dolomite may be necessary to raise the soil pH to the most favourable level of 6·0.

The soil should be worked to a fine tilth. A few days before planting, the soil is formed into beds approximately 150 mm high and 1·5 m wide to accommodate four rows of plants.

Planting material

Portions of the underground rhizome known as 'seed-pieces' are used as planting material. A piece weighing between 50 and 80 grams is recommended for planting. The rhizome is carefully divided into pieces, care being taken to leave at least one eye or bud on the cutting. The cut pieces should be allowed to heal before planting to reduce the possibility of fungus infecting the tissue.

Seed can be used from an established patch of ginger or purchased from a supermarket where it is sold as green ginger.

Planting

September is the best time to plant. This allows the young plant to become well established before the onset of hot weather from October to December when plants are subject to sunburning.

A planting of about one square metre should yield about 6 kg of ginger rhizomes. This should give approximately 4·5 kg of the candied product, about the same weight as crystallized ginger.

The seed pieces are normally planted at 150 to 200 mm intervals and covered with 25 mm of soil.

Fertilizing

Even when the soil has received a dressing of animal manure, a pre-plant application of 60 to 100 grams per square metre, depending on soil fertility, of a complete fertilizer mixture containing 10% nitrogen, 4% phosphorus and 6% potash should be applied.

The basal fertilizer can be broadcast over the beds, or drills are opened up along the proposed planting rows to a depth of 100 mm, and the fertilizer is applied along the base and sides of the drill and then covered over with soil.

Ginger benefits from regular side-dressings of nitrogen fertilizer. From early November and at monthly intervals thereafter until April, apply 10 grams of urea per square metre. The fertilizer should be watered-in immediately.

Mulching

The ginger planting may be mulched with sawdust or blady grass. Mulching conserves soil moisture, it controls weed growth and the rhizomes are clean with a soft peel when harvested.

The mulch is applied as soon as the seed is planted. Sawdust should be spread 75 mm thick over the soil, and blady grass about double this thickness.

Watering

The soil should be watered after planting and before any mulching material is applied. Until the young shoots appear, only light waterings will be necessary. Thereafter, water should be applied at regular intervals, depending on weather conditions, to maintain adequate soil moisture and keep the plants growing vigorously. However, over-watering should be avoided.

Young ginger plants are very susceptible to sunburning when temperatures exceed 32°C. When sunburning weather occurs, frequent very light waterings should be given, particularly between 10 a.m. and 3 p.m. This establishes a micro-climate over the ginger, cooling both the air and soil. If the area is not too large, 50% shade cloth may be erected over it during October, November and December. This will eliminate sunburning.

Harvesting

Ginger for use in confectionery and syruping is usually harvested from late February to mid March, before the rhizomes become too fibrous.

From early April onwards, the rhizomes become more fibrous and the ginger is then suitable for the manufacture of dried or ground ginger.

The new ginger is carefully dug out with a garden fork and the tops trimmed. The rhizomes are then scrubbed with a stiff brush before being prepared for confectionery processing.

Some roots may be left in the ground to be used as seed pieces for planting in the spring. Usually, the rhizomes are dug out in June or July and hung in hession bags in the shade under shelter until required.

Information on the preservation and processing of ginger is contained in a leaflet available from the Sandy Trout Food Preservation Research Laboratory, Hamilton, Brisbane, 4007.

CHANGING YOUR ADDRESS?

Please let us know as soon as possible if you intend changing your address.

Because the addressed wrappers and journals are printed separately, changes cannot take effect until the next batch of wrappers is printed.

This means that, in some cases, subscribers will receive the next issue at their old address.

If possible, two months notice should be given to ensure your journal is sent to the correct address.

Perfect home-style pies

THESE pies look and taste as if it has taken hours of preparation to produce this delicious, home-style meal.

Puffy, light layers of pastry or short, buttery crusts with fillings of cabbage, pumpkin and Cheddar cheese; tuna and oyster soup, or creamy sweetcorn with a spring onion custard.

The secret is refrigerated, prepared pastries, canned products, fresh vegetables, and grated or crumbled cheese varieties—foods that require simple or little preparation. But there is a hint to remember, allow the pastry to rest 30 minutes before filling and baking, it ensures the perfect pie.

Cheesey pumpkin cabbage pie.

Cheesy pumpkin cabbage pie

Standard 250 ml measuring cup and 20 ml tablespoon are used. All measurements are level.

approximately 375 g refrigerated puff pastry
egg to glaze

FILLING

250 g pumpkin, grated
185 g curly-leaved cabbage, finely shredded
1 chicken stock cube, crumbled
¼ teaspoon ground black pepper
2 teaspoons worcestershire sauce
1 tablespoon flour
250 g Australian matured Cheddar, grated

Roll pastry to 2 mm thickness. Use half to line the base of a 23 to 25 cm pie plate. Allow to rest for 30 minutes. Press pumpkin, then cabbage over the base of the pastry case. Sprinkle seasonings and flour evenly on top. Place Cheddar cheese evenly over cabbage and press down firmly. Brush rim of pastry base with egg. Top with remaining pastry and trim edges. Decorate with pastry scraps as desired. Brush with egg to glaze. Bake at 230°C for 10 minutes. Reduce oven temperature to 190°C and bake for a further 30 minutes. Serve hot with a cream soup and hot chicken, or with sliced luncheon meats. Serves 6.

Fisherman's pride

1, 454 g packet refrigerated puff pastry
beaten egg for glazing

FILLING

1, 184 g can chunk style tuna, drained
3 eggs
125 g Australian matured Cheddar cheese, grated
1, 432 g can cream of oyster soup
1 tablespoon flour
2 teaspoons vinegar

Roll pastry to 2 mm thickness. Use half to line the base of a 25 cm pie plate. Using a 5 to 6 cm round biscuit cutter, cut remaining pastry into circles. Allow to rest for 30 minutes. Place tuna evenly over the pastry base. Beat eggs well and combine with remaining filling ingredients. Pour on top of tuna in pastry case. Brush rim of pastry with beaten egg. Overlap pastry circles gently on the outside rim of the pie leaving the centre of the pie open. Glaze pastry surfaces gently with beaten egg. Bake at 230°C for 10 minutes. Reduce to 180°C and bake for further 30 minutes. Allow to stand 10 minutes before cutting. Serve with hot tomato soup as a luncheon idea. Serves 6 to 8.

Sunshine corn pie

Approximately 375 g packet refrigerated shortcrust pastry

Beaten egg for glazing

FILLING

3 eggs

125 g Australian matured Cheddar cheese, grated

1, 310 g can creamed sweetcorn

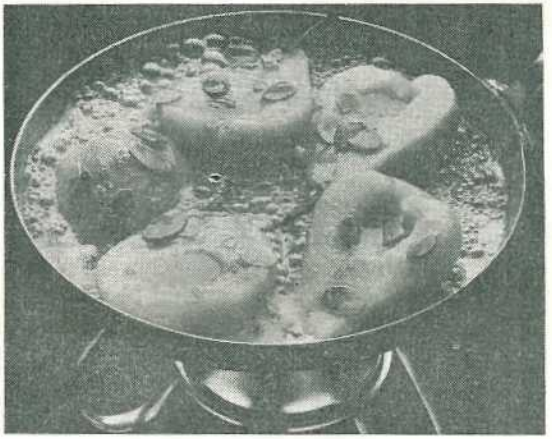
6 spring onions, including some green tops, chopped

½ teaspoon salt

⅛ teaspoon cayenne

Roll pastry to 3 mm thickness. Use half to line the base of a 23 cm pie plate. Cut remaining pastry into 4 cm strips. Allow to rest for 30 minutes. Beat eggs well and combine with remaining filling ingredients. Pour into prepared flan. Brush pastry rim with beaten egg. Place pastry strips on top leaving a 1 cm gap between each strip, to allow filling to show. Trim edges. Brush strips with beaten egg to glaze. Bake at 200°C for 10 minutes. Reduce oven temperature to 180°C and bake for a further 30 minutes. Serve hot or cold with hot chicken noodle soup or beef consomme. Serves 6.

Butter-sauced fruits



Apricot almond pears.

IMAGINATIVE, butter-sauced desserts are the ideal complement to home-style pies.

They're hot, quick to prepare and only require a heavy-based frying pan, fruits such as pears, apples, bananas and oranges; butter with jams, honey or golden syrup and a liquid to sauce the simmering fruits.

Accompany with scoops of ice-cream, waffles, panjacks or top with whipped cream.

Butter-syruped apples

Standard 250 ml measuring cup and 20 ml tablespoon are used. All measurements are level.

4 cooking apples, cored and halved.

SAUCE

3 tablespoons butter

1 cup water

¼ cup sultanas

2 tablespoons golden syrup

Combine all sauce ingredients in a wide-based fry pan. Stir over heat until butter is melted and mixture is gently simmering. Add apples, cut side up. Cover pan tightly with foil. Cook for approximately 5 to 10 minutes. Remove foil, turn apples, allow syrup to evaporate for a few minutes until thickened to desired taste. Serve hot with hot panjacks, cream or ice-cream. Serves 4.

Hot honeyed bananas

4 firm bananas, halved lengthwise

8 cherries, halved

SAUCE

3 tablespoons butter

2 tablespoons honey

1 tablespoon lemon juice

1 tablespoon water

Combine all sauce ingredients in a wide-based fry pan. Stir over heat until butter is melted and mixture is gently simmering. Add bananas and cherries. Continue heating for 2 to 3 minutes until bananas are heated through. Spoon into serving dishes and serve with cream, ice cream or hot cooked waffles. Serves 4.

Apricot almond pears

1 tablespoon slivered or flaked almonds

4 cooking pears

SAUCE

3 tablespoons butter

1 cup water

3 tablespoons apricot jam

¼ teaspoon vanilla essence

few drops almond essence

Place almonds in a wide-based fry pan and toss over heat until golden brown. Remove from pan and set aside. Peel pears and halve lengthwise leaving the stalk attached to one half. Using a teaspoon, scoop out the core from each centre. Combine all sauce ingredients in the pan. Stir over heat until butter is melted and mixture is gently simmering. Add pears and cover pan tightly with aluminium foil. Cook pears till tender when pierced with a skewer. Remove foil and allow juice to evaporate for a few minutes until thickened to desired taste. Sprinkle almonds on top. Serve hot with cream, ice cream or custard. Serves 4.

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Layer packing of frozen meat

FREEZER storage of meat has one major problem. It is often difficult to select the most suitable quantity and type of meat when it is needed.

These difficulties can be avoided by layer packing meats, and labelling them according to cut (round, rump) or cooking type (frying, braising).

For layer packing, rolls of plastic sheeting of suitable width and thickness are needed. A width of 23 to 30 cm is satisfactory—roll lengths vary from 30 to 45 m. The plastic rolls available through chain stores and grocer shops are generally thin. The heavier and stronger types available from trade suppliers are more suitable.

For convenience in selection, have the sliced meat cut into portion sizes before packing.

Approximately 30 cm of the plastic is unrolled, and a single layer of meat placed on it. The plastic film is drawn over the top of this layer of meat, forming a base for the next layer. By repeating this procedure, a pack several layers high may be made, each separated by a plastic film. This is then enclosed in a plastic bag which is sealed, identified and frozen.

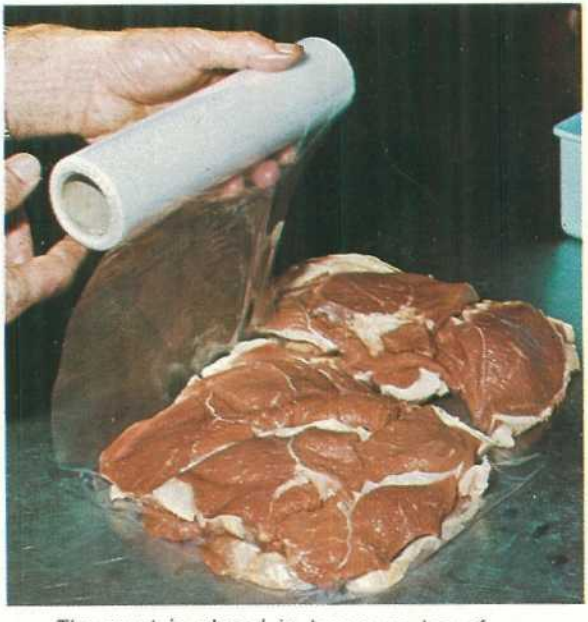
After freezing, each layer is readily separated by insertion of a kitchen knife at the plastic inserts. Each layer may be broken into portions if correctly packed, and cooked direct from the freezer if thinly sliced (9 mm to 12 mm) before packing and freezing. If possible, avoid having the meat overlapping the edges of the plastic, and keep each layer even.

Alternatively, meat may be packed into a soft plastic container with an airtight lid.

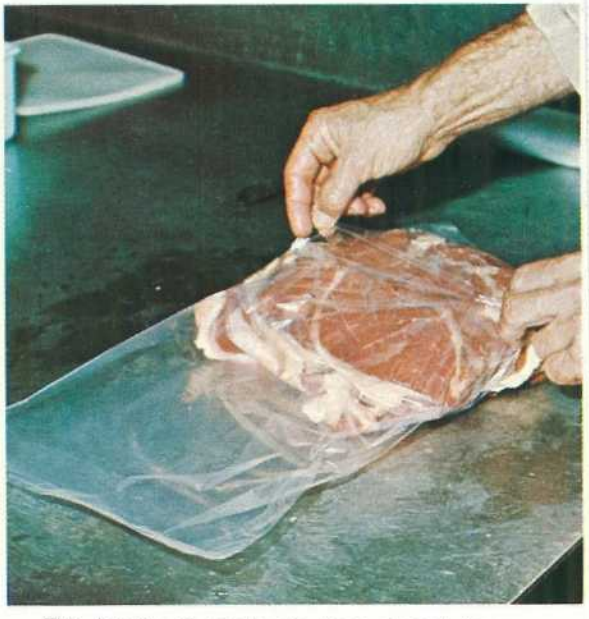
Approximately 60 cm of plastic is unrolled to cover the base of the container, and a layer of meat packed on it. Plastic is folded over this layer, and the procedure repeated until packing is completed. Remember that the top layers must also be covered with plastic. The airtight lid is fitted, and the container placed in the freezer. This method gives a neat pack and avoids waste space.

When selecting meat after freezing, hold the lid and container under a cold water tap until the plastic softens. Plastic becomes brittle at freezer temperatures, and may fracture when bent. After removal of the lid, the block of frozen meat is taken from the container, and the most suitable cut and quantity is selected.

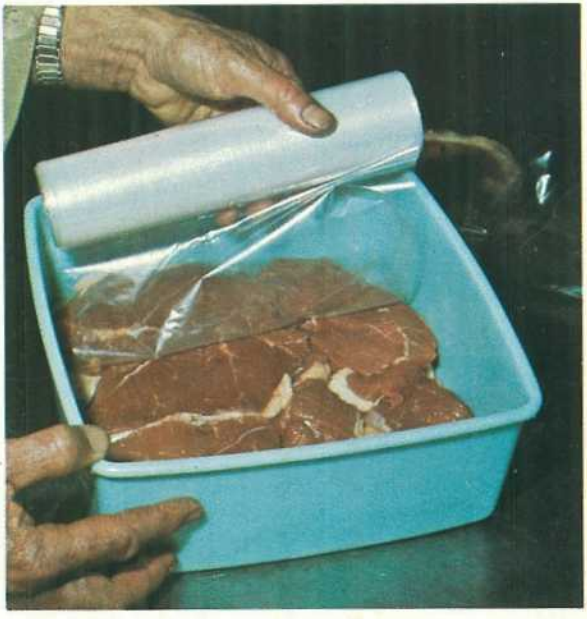
Layer packing of frozen meat



The meat is placed in layers on top of the plastic sheeting.



The layers of meat are then placed in a plastic bag or container.



Space is saved if the meat is packed direct