QUEENSLAND AGRICULTURAL JOURNAL

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ORGANISATION OF THE AGRICULTURAL INDUSTRY.

The Queensland Producers' Association.

Monthly Record of Progress and Achievement.

The last Regular Monthly Meeting of the Council of Agriculture was held in the Council Room, Teachers' Training College Building, Turbot street, Brisbane, on Thursday, 16th November. Subjoined is a Record of Proceedings covering many matters of first importance to the Farming Industry.

Attendance.

The Hon. W. N. Gillies (President), Messrs. J. Purcell (Vice-President), E. Graham, T. Flood Plunkett, J. T. Tod, W. Purcell, H. Keefer, J. E. Dean, F. M. Ruskin, H. I. H. Ross, W. Ranger, S. J. Howe, F. J. Morgan, T. Muir, R. Swan, C. V. Hives, W. G. Batchler, C. H. Pritchard, W. Short, and the Director (Mr. L. R. Macgregor).

DAIRYING COMMITTEE.

Metropolitan Milk Supply.

The Dairying Standing Committee recommended that the scheme submitted by the Metropolitan Milk Producers' Association in connection with the milk supply of the metropolis, be referred back for further investigation by the Committee.

Herd Improvements.

A letter from the Millaa Millaa Producers' Association, suggesting that bulls from the State Farm be leased for periods to farmers, was referred to the Director of Dairying (Mr. E. Graham) for his consideration, with a request that he furnish a report to the next meeting of the Committee. He was further requested to submit suggestions regarding the rules of Herd Book Societies in order that the matter may be taken up with the Breeders' Association.

Hamilton Cold Stores.

In connection with the control of the cold storage works at Hamilton, the President (Hon. W. N. Gillies) said that the Cold Stores were being built to meet the needs of the dairying industry, and for some time would be used exclusively for that purpose. Roma Street Cold Stores would be used for fruit. It was decided that control should be vested in the Department of Agriculture.

ADMINISTRATIVE COMMITTEE.

Regulations, Primary Producers' Organization Act.

A clause in the Draft Regulations under the Primary Producers' Organisation Act was amended to read:—

> "That each District Council, upon formation, shall elect to the Council a representative who is a member of a Local Producers' Association, or, who, in the opinion of the Council, is a person directly representing producers."

A further amendment provided for the conduct of the elections of District Councils by postal ballot from Head Office.

Secretaryship.

Approximately 140 applications were received for the position of Secretary and Accountant, and from these a selection of four was submitted by the Administrative Committee for consideration by the Council. It was decided that the Council interview each of these applicants at its next meeting.

Advertising Primary Products.

A scheme outlined by the Director for advertising primary products received the approval of the Council. With a view to stimulating public interest in the State's primary products, and to induce increased consumption, it is proposed to have successive window displays of various agricultural products, and to devote the first show, as from the beginning of December, to cheese. The display will be staged in the window of Kodak Ltd., Queen street. It will take the form of cheese exhibits, with pictures illustrating the various processes of manufacture and data showing production and the value of cheese to the State. Prepared dishes, showing how readily cheese may be used as an article of diet, together with attractive recipes and comparative tables figuring the nutritive value of cheese in relation to other forms of food, will be a feature of the exhibit.

Membership of the Association.

The Supervisor of District Agents reported that to date 533 Local Producers' Associations have been formed, with a total membership of 10,742, and the work is proceeding satisfactorily.

FRUIT COMMITTEE.

Selling Agents' Charges.

The Council noted that the Crown Solicitor is of the opinion that the Commissioner of Prices has the necessary power to fix the commission charges by agents in the sales of fruit in the Brisbane markets, and decided that in the circumstances he be requested to investigate the rates of commission being charged by agents with a view to bringing about a reduction in the rates at present ruling.

Elementary Chemistry.

A communication from the Department of Agriculture to the effect that a new edition of the Agricultural Chemist's (Mr. J. C. Brünnich) book "Elementary Lessons on the Chemistry of the Farm, Dairy, and Household" is about to be issued was noted with satisfaction.

The Summer Pineapple Crop.

Arising out of a communication received from the S.Q.F.S. Ltd., on the subject of the marketing of the forthcoming crop of pineapples, that Society was advised that action had already been taken by the Federal Fruit Council with the object of inducing Great Britain to give preference to Australian canned fruits and jams, and that arrangements had been made by that Council to advertise primary products. Further, that the question of exhibiting Queensland preserved fruits and other suitable products at the forthcoming Imperial Exhibition would be further considered at the December meeting of the Committee.

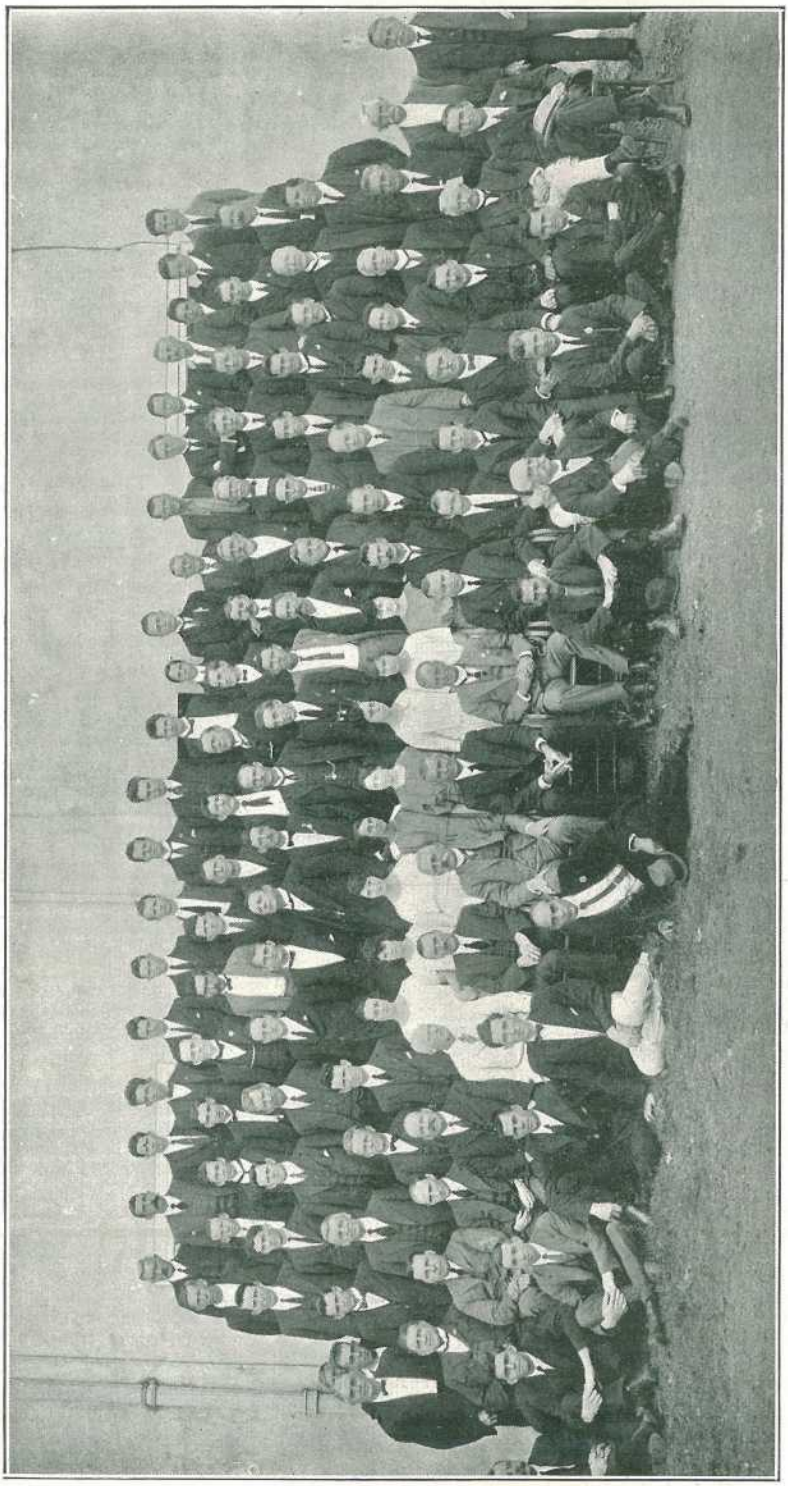

PLATE 89.—THE MINISTER FOR AGRICULTURE, HON. W. N. GILLIES, AND THE FIELD AND GENERAL STAFF OF THE BRISBANE OFFICE, DEPARTMENT OF AGRICULTURE AND STOCK.

WHEAT COMMITTEE.

Maize Storage.

The Director submitted a scheme for the handling and storage of maize, in the Cairns Hinterland, which the Council considered, and decided to recommend to the Government the advisability of securing the services of an engineering expert to report upon the practicability of giving effect to the suggestion of the Director.

Tariff on Maize.

In connection with a letter received from the Wooroolin Local Producers' Association on the subject of the importation of maize from South Africa, the Committee advised the Association of the action already taken by the Council with the object of inducing the Federal authorities to impose a tariff duty of 3s. 6d. per cental on the maize in question.

General.

In the matter of the supply and distribution of bags to Local Producers' Associations, the Committee recommended that the Director consult with the Wheat Board.

The matter of one board to deal with marsupials and rabbits was listed for further consideration by the Committee at its next meeting.

The action taken by the Victorian Farmers' Union to bring to fruition the stabilisation proposals was noted with satisfaction.

The Department of Agriculture advised the Committee that draft plans of model dairy buildings were now in the hands of the printer.

A letter from the Hunterton Local Producers' Association urging the Council to establish Central Selling Agencies was referred to the Director.

NEW STAFF APPOINTMENTS.

Messrs. W. G. Wells, Cotton Expert, and J. M. Ward, Chief Instructor in Fruit Culture, were appointed recently to the professional staff of the Brisbane Office of the Department of Agriculture and Stock.

After qualifying in other fields, Mr. Wells entered the service of the United States Department of Agriculture at the Cotton Experiment Station, San Antonio, Texas, the largest cotton producing State in the Union. Mr. Wells first devoted his attention to plant breeding, and became the field man in charge of cotton breeding stations, doing field and demonstration work for his department in Texas, California, and Arizona. In 1920 he resigned his U.S. Federal appointment to join the professional staff of the S.W. Cotton Co., a subsidiary concern of the Goodyear Tyre Corporation. At the time of his engagement by the Queensland Government Mr. Wells was managing a cotton ranch for the Goodyear people. Mr. Wells is now travelling through the Queensland cotton areas for the purpose of making himself familiar with local conditions.

Mr. J. M. Ward was Fruit Expert for the Tasmanian Government, and his work and career are well known to the orchardists of this State. Mr. Ward has had a wide experience in practical fruit culture, and in organising and administrative work connected with the industry. Prior to joining the Tasmanian Department as assistant fruit expert, in May, 1914, he was engaged in orcharding at Glenorchy, and was one of the largest and most successful apricot growers in the Island State. He delivered lectures in practically every fruitgrowing district in Tasmania on many occasions, and for three years conducted winter horticultural classes at Launceston. Mr. Ward was one of the prime movers in organising growers on co-operative lines. In 1918 he visited the western States of America and Canada on behalf of the Tasmanian Government, and studied the latest methods of organisation, co-operation, and standardisation of fruit, and the treatment of pests. He gained much valuable knowledge, and on return placed it at the disposal of growers. At the invitation of the Victorian fruit growers, he lectured at their annual meeting, and this year he lectured in Adelaide before the Australian Fruitgrowers' Conference. Recently, at the invitation of the Queensland Government, he delivered a series of lectures extending over fourteen days through the citrus and deciduous fruitgrowing districts of this State. He has represented the Tasmanian Government at different conferences in the majority of the mainland States. Mr. Ward on two occasions visited Brisbane in charge of a Tasmanian exhibit of apples.

FRUIT FLY INVESTIGATIONS.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report of the Entomologist in charge of Fruit Fly Investigations at Stanthorpe, Mr. Hubert Jarvis, for the month of October, 1922.

A TOOWOOMBA QUEST.

A visit was made on 11th October to Toowoomba in order to ascertain at this time of the year the presence or otherwise of the Fruit Fly (*Chaetodacus tryoni*) in that district, in any one or more of its phases.

Whilst pursuing this inquiry in company with Mr. W. Leslie, Instructor in Fruit Culture, visits of inspection were made to the following orchards and gardens:—J. McGovern, Middle Ridge; F. Scott, Bellevue street; Miss Fletcher, Dudley street, Range; T. Cardingly, Rangeville; W. Hutchison, Range; J. H. Hartman, Range; G. Dunster (Nurseryman), Toowoomba; E. Postle, Harristown; and F. Swift, Harristown.

In the Soil.

Search was made for the pupa of the fruit fly under the following trees:—Orange (Valencia late), lemon, custard apple, cherry plum, persimmon, apple (var. Lord Nelson), cherry guava, plum, quince, peach (late), loquat, and walnut. No living pupæ were, however, met with in these situations.

In Fruit.

The following fruits were examined for fruit fly larvæ:—Orange, lemon, and loquat.

In the citrus fruits no larvæ (maggots) were discovered; but in almost every case loquats examined were found to contain fruit fly maggots in different stages of growth. Many of these maggots have subsequently given rise to the mature fruit fly—*Chaetodacus tryoni*.

The loquat is a much grown fruit in Toowoomba, particularly the variety of it ripe at this time of the year; numerous gardens are scattered throughout the district, each supporting at least one loquat tree, in some cases two or three.

This fruit is, I understand, of little commercial importance. Ripening, as it does, just prior to the maturing of the citrus fruits, it certainly constitutes a serious source of fruit fly infestation to these later fruits, more especially so as in many cases loquat trees are growing close to and even amidst the orangeries. These features connected with the loquat and loquat growing would almost warrant the destruction of this tree, or at least a systematic destruction of its fruit, prior to its ripening.

Walnut.

Mr. T. Hutcheson (Range) informed me that last season the walnuts on his trees, and on those of his neighbour also, harboured the maggots of some fly, which he presumed were those of a fruit fly, being similar in appearance and size to the maggots of the Queensland fruit fly.

These maggots, however, were probably those of some other fly and were first observed and recorded by Mr. H. Tryon, Government Entomologist and Vegetable Pathologist, in 1889 (*vide* Report on Insect and Fungus Pests of the Toowoomba District).

Wintering of Fruit Fly.

Although the soil under such late fruits as custard apple, quince, and late apple was carefully examined (*i.e.*, put through a 1/16-inch mesh sieve) for fruit fly pupæ, failure to find any would seem to indicate the non-wintering in the soil, of the fruit fly in the Toowoomba district. This, however, is a subject for further inquiry.

Some of the oldest residents at Toowoomba affirm that the loquat trees are fruiting there almost continuously throughout the year. It would be interesting to ascertain if loquats, ripening (should they do so) in very late autumn, or very early spring (about August), contain fruit fly maggots.

I am indebted to Mr. W. Leslie, Instructor in Fruit Culture, stationed at Toowoomba, for much help and assistance.

WARWICK INVESTIGATION.

A visit was also made on 30th October to Warwick, where a similar inquiry to the foregoing was carried out, and with somewhat similar results.

The only ripe fruit in Warwick gardens at the time of the year mentioned was the loquat, and in this fruit fruit fly maggots were discovered identical with those found in loquat fruit in Toowoomba. In Warwick, however, the loquat is quite a scarce tree, and thus considerable difficulty was experienced in locating the four trees met with.

TRAPPING FRUIT FLY EXPERIMENTS.

Glass fly traps containing various so-called fruit fly lures, and placed in various parts of the district, have, throughout the month, failed to attract one individual even of the Queensland Fruit Fly (*Chaetodacus tryoni*) nor have any examples of this species been observed at blossom.

FRUIT FLY MAGGOTS IN IMPORTED FRUIT.

On 18th October Instructor J. Henderson submitted specimens of late Valencia oranges harbouring fruit fly maggots; these oranges were sent in the course of trade from Brisbane. From twelve of them, 130 fruit fly maggots were reared to the pupa stage in the laboratory, one female fruit fly (*Chaetodacus tryoni*) having so far emerged to date. The careful and thorough inspection following this event now being carried out, of all fruit imported into the Granite Belt, should prove a control measure of much importance.* The possible injury to this district, through the distribution of even one or two cases of infested oranges (should such escape inspection) cannot be over-estimated; this amount being, in fact, very much more than sufficient to distribute the fruit fly throughout the entire area. Any recipient of fruit—either by rail or post—on finding this to contain maggots, should immediately destroy it either by fire or by burying it at least 2 feet underground.

I consider this watchfulness and care, more especially at this time of the year, of the utmost importance, in keeping the district free of fruit fly, and were this care and watchfulness consistently carried out by every individual, it would, it seems, not only materially help to control the pest, but would also undoubtedly retard its advent to this district. Much, however, has yet to be learnt in relation to the habits and life history of the fruit fly (*Chaetodacus tryoni*), the distance it can fly, its longevity, native host-fruits, &c.

Presuming, as is stated by some entomologists, that the fruit fly cannot fly far (*i.e.*, about 1½ miles), the importance of closing every avenue of mechanical introduction by the systematic inspection before alluded to, or by exclusion (if deemed necessary) with respect to certain fruits during the spring months, finds in this fact especial justification.

OTHER INJURIOUS INSECTS.

Peach Aphis.

Although not this season so widely distributed throughout the district as in some previous years, yet the Black Aphis of the peach has done, and is still doing, a considerable amount of damage in certain districts. Control experiments have been started with the injector (kindly loaned to the office by Mr. W. F. Barnard), the chemical used being carbon bi-sulphide. Several trees were so treated at Eukey, and not only there for Black Aphis of stone fruit, but also for the Woolly Aphis of the apple. It is hoped to continue experiments in this direction in other localities also, and results as obtained will be reported monthly. On 10th October the Black Aphis was found plentifully on the fibrous roots of peach trees at Applethorpe. No winged forms were observed in this situation, but adult viviparous wingless females and immature forms also were abundant, all underground at a depth of about 12 inches. Should this insect winter on the roots of the peach and plum trees as is very probable, control measures with the injector in late winter might prove of benefit.

Aphis sp.

On 10th October my attention was drawn to an Aphis visitation at Applethorpe. This Aphis, that at present is specifically undetermined, visited the above district and simultaneously (as I have since ascertained) the entire Granite Belt. Although in vast numbers and settling on cultivated plants of a great many varieties, this insect appeared to do little harm and, moreover, by the end of the month had practically disappeared. It was observed on the following trees and naturalised herbaceous plants:—Apple, plum, pear, nectarine, oat, milk thistle, pigweed, turnip, and bean (broad and French varieties). I learn from the testimony of various orchardists—old residents in the district—that the visit of this Aphis is a yearly one, and that it has not been found to ever materially damage fruit trees. In my own garden, however, I observed that both "Broad" and French beans were, as the outcome of infestation by it, retarded in growth.

* Mr. Henry Tryon, Entomologist in Chief, Department of Agriculture.

FUNGUS DISEASES.

Several specimens manifesting disease of fungus or other origin were during the month submitted to this Office, and forwarded to the Government Entomologist and Pathologist (Mr. H. Tryon) for identification of the parasitic agent operating.

FIELD WORK.

Visits of inspection have been made during the month to the following districts:—Bald Mountain, Eukey, The Summit, Beverley, Glen Aplin, Applethorpe, Warwick, and Toowoomba.

SUGAR: FIELD REPORTS.

The Northern Field Assistant, Mr. E. H. Osborn, reports under date 9th October, 1922, as follows:—

Babinda.

This area was inspected early in the month and found to be suffering from the same dry conditions that were in force further south. The registered rainfall to 30th September amounted to 162.01 inches, against 328.1 inches for the same period during 1921. Of this fall 3.66 inches fell in July, 1.52 inches in August, and 2.45 inches during September.

Very cold weather had also been experienced during the spring and winter months, and consequently the cane had made poor growth and the total amount to be harvested will be considerably below the early estimates.

These weather conditions are also responsible for the backward state of the recently cut ratoons, and to a slighter extent the young plant cane.

Generally speaking, the strike of plant cane has been a very good one and at time of visit it was very green and healthy looking, though somewhat backward. In nearly all cases it was very clean and showed that full advantage had been taken of the dry weather to carry out thorough cultivation. The mill is doing very good work, averaging well over 5,000 tons per week, and the cane supply is very regular. The density figures were also very good, as the average density for the 5,445 tons crushed in the week ended 30th September was 15.4 c.c.s., whilst the tons of cane to ton of sugar worked out at 6.7 tons. These figures in the Babinda area are very good. The large amount of land recently stumped and ploughed was most noticeable.

Tractors.—Tractors have become popular in this area, no fewer than four of different types having been landed here since last June.

New Varieties of Canes.—Quite a number of the local growers have planted out canes from the South Johnstone Experiment Station, the principal varieties being Tableland Badila, E.K. 1, E.K. 28, Q. 903, H. 146, H.Q. 409, H.Q. 458, &c., and in most cases these germinated well.

Freshwater.

This area was visited early in the month and despite the dry weather the general appearance of the crops was most encouraging. Some very heavy crops have been harvested and most of the recently cut cane has ratooned very well; some splendid young plant cane was also seen. Badila is the only cane grown at Freshwater, and it certainly responds well on the rich and deep alluvial flats.

Hambledon.

A very large area of land has been planted and replanted lately in the above area, and in most cases the strike has been very fair. Quite a large area of the land ploughed out has been grub-affected, and in most of these places where Badila has been grown D. 1135 is now being planted. Upon several of the farms small plots had been planted out with some of the newer varieties obtained from South Johnstone Experiment Station, and generally speaking they looked very fair.

Most of the paddocks of young plant cane looked very clean and free from weeds, and all that was wanted was a good downpour of rain to help the growth along.

Mulgrave Mill Areas.

Crushing was in full swing in this large area and the mill was doing exceptionally good work, the general mill work and the quantity of sugar turned out easily beating all former records.

No time had been lost in the mill or field by labour troubles, and everything was working in a very satisfactory manner. Regarding the cane being harvested, the dry conditions have reduced the previous tonnage estimates considerably, and at time of visit the mill expected to finish crushing early in December. In visiting the farms it was most noticeable that those that had been kept in a high state of cultivation were standing up to the dry conditions far more than the others. Generally speaking, the standard of cultivation in this area is high; had it not been so the crops now being cut would have been much lighter.

A large quantity of manure (mixed) is annually used in the area, also green manuring and liming. Another manure that is used here is crushed filter press cake which is bagged and supplied to the growers by the mill management. All through the area large blocks of land have been worked up and planted for next season, and in most cases a good strike had been the result. Rain was wanted urgently. Recently cut ratoons were very backward in growth. Badila, H.Q. 426, Goru, and D. 1135 are easily most in favour, while Malagache was seen in one or two places. Some very fair crops of D. 1135 were harvested. This variety did not cut as well as was expected of it earlier in the season, although it kept its growth fairly well during such a dry period.

Quite a large area has been planted out, especially in the grub-affected areas, and the strike has been uniformly good. While in the area a visit was made to the locality known as "the Little Mulgrave." This area is, roughly, speaking, some 5 miles from the end of the permanent tramline at Riverstone, and at present a couple of miles of temporary rails are joined on to this, leaving some 3 miles to be served with rails from this point.

The interested growers talk of finding the requisite rails and thus open up some first-class country for next year. Some of the growers consider that they can find (approximately) some 800 to 1,000 acres of really good cane land within a couple of miles of this proposed railhead. The land itself is mostly rich pockets of deep light alluvial soil, suitable for growing very heavy crops of cane. Some remarkably good Badila, going probably from 45 to 50 tons to the acre, was being cut upon Mr. C. Ross's farm; the recently cut ratoons from same, although, so far, unworked, looked very well.

Several fine paddocks of young plant cane were also noticed in this locality; in fact, the general appearance of the cane being cut and also the young cane coming on was extremely good.

It is satisfactory to note that the use of tractors is increasing rapidly in this area. While visiting the district a consignment of three was made to a local agent.

Pests.—A good deal of loss was caused by grubs, bats, and borers during the year. A number of old and experienced growers state that the rat pest upon some of the farms adjacent to the river or creeks has been greater than in any former years, and from personal observation joined to a good knowledge of the district I believe such is the case. Grubs and borers also did a good deal of damage, and on top of this the lengthy spell of very dry weather during the past few months helped to account for the 20,000 tons of cane that the mill management expect to be short by the end of the crushing season. At time of my visit rain was urgently required to help the recently cut ratoons and also the young plant cane along. So far the latter looks remarkably green and healthy and is very free from weeds. A few light showers of rain were experienced about the 23rd and 24th, which will do a great deal of good, but much more is required to be of any lasting benefit. Without such the outlook for next season is not too promising.

The Southern Field Assistant (Mr. J. C. Murray) reports under date 23rd November, 1922.

Mackay.

In the immediate environs of Mackay the cane cut with moderate tonnage had good c.c.s. value. The Racecourse Mill, which takes most of this cane, had a good run, and has finished crushing. The haulage facilities in this area are not up to date, the farmers having to cart their cane by means of horse teams, which mutilate the roads and cause much loss of good time. Notwithstanding this drawback the area is progressing in the direction of good farming, and there is an atmosphere of considerable apparent prosperity.

Varieties which gave good returns in this locality for this season are Q.813, with an approximate average of 16 c.c.s.; M.1900 seedling, density 17 c.c.s.; Malagache, 14 c.c.s.; M.189, 17 c.c.s.; Badila, 17 c.c.s.; and Q.970, 16 c.c.s. The cutting this year has been very fair, although an occasional grower has been taking off too

much top. Tops tested taken from Q.813 analysed 11.4 c.c.s., and it is probable, judging by the cane cut off, and taking the density of the top as a basis, that growers cutting too severely were losing about £3 per acre.

The borer is inflicting a little damage on the cane this year in this locality, although not sufficiently to cause the farmer much anxiety. M.1900 Seedling appears to have been attacked more than other varieties, and the effect is slightly noticeable in the purity tests. Mr. Keogh, the chemist in charge at Mackay Sugar Experiment Station, noticed that in unbored 1900 Seedling the purity was 96.4, while bored cane of the same variety stood at 94.2. However, the incidence of cane damaged by borer is so slight as not to cause the farmer any misgivings. This area is also fairly free from the depredations of the cane grub.

Mirani.

The cane on this section of the Pioneer, as far as Pleystowe, has not cut heavily, but the sugar-content has been high. The crops are coming on for next season, and look very well indeed, although rain is badly needed. Much of the young ratoon cane looks particularly well, especially that which was not cut too early in the season. Such canes particularly are M.1900 Seedling and H.Q.426. The farmers in this area are now undoubtedly doing good farming. This is probably due to two reasons—a better financial position and an increased knowledge of their soil and its requirements. More lime is wanted on these soils, and a still greater use of crops calculated to strengthen the humus supply. Fertilising with highly concentrated fertilisers should be undertaken most carefully, and it is to be pointed out to the farmers that much valuable information can be obtained within the community by carefully watching each other's fertilising efforts on typical soils.

A small amount of leaf disease is in evidence in the cane in this locality. The only effective method of contest in this respect is careful plant selection. In the case of gumming, of which a little is also apparent, the field should be given as long a rest as possible and a resistant variety to gum such as Q.813 or the early maturing variety H.Q.285 planted. However, the injurious effects of these diseases are very slight in this district at present.

Finch Hatton.

The cane on the fertile flats in the vicinity of Finch Hatton probably cut heavier tonnages than elsewhere in the Mackay district. The mill had a very fair run, and the c.c.s. value of the cane was uniformly high. On the higher lands of Finch Hatton the soil is not so rich, and wants deep cultivation and green manuring. It is probable, regarding fertilisation, that on a soil of this description meatworks manures would be most effective, taking as a basis known results on soils that are fairly typical in colour and texture to these.

Cane varieties doing well in this district are D.1135, Q.813, H.Q.426, Cheribon, and M.1100 Seedling.

Farmers are strongly advised not to use the plough in young plant cane, for the reason that at a critical state of the plant's life the young roots are damaged, and growth is also retarded by the inverting of soil particles and a consequent disturbance of the fermentation and chemical processes that are going on in the soil at this critical period. Cultivating ratoon interspaces and young plant cane interspaces are entirely different processes.

The growers in the Finch Hatton district are handicapped by primitive haulage arrangements, much of the cane having to be carted by teams several miles. This applies particularly to the farmers on the north side of the river. There is a big area of cane land in this fertile district still uncultivated. However, with the increase of settlement and the assurance of a living price for cane this land will in time, no doubt, be farmed.

Plane Creek.

Crops here are fair, with the usually high density that the farmers obtain. Young plant and ratoon crops are making good growth, although more rain is badly needed. During the last few years farmers in this district have greatly increased their areas on account of the encouragement given by recently prevailing prices.

Cane varieties looking well at present are H.Q.285, Q.813, H.Q.426, M.1900, and D.1135. These are all favourite varieties here. The growers are recommended to try E.K.I, as well, this cane having excellent standover properties. The mill at Sarina has this year reached a high standard of efficiency, and the crushing went through almost without interruption. An excellent labour-saving device recently installed by the management is a big switcher. It is interesting to note the speed and facility with which the operator does his work during the bagging process.

Homebush.

The young crops, plant and ratoon, look well here, and the cutting season is progressing without interruption. The Rosella Siding presents a busy appearance just now, with its electric lighting plant, loading crane, and gangs of workmen all going at high pressure. Rain is wanted on the Homebush areas, although the cane can still go on without rain for some time yet without receiving a noticeable check.

The growers are doing good cultivation generally, but more vegetable manures are wanted on their soils. The soil here is a light forest loam for the most part, and meatworks fertilisers would probably be most beneficial.

Farleigh Areas.

In common with the other Mackay districts the tonnage on the farms within the influence of the Farleigh Mill has not been great this season, but the sugar-content of the cane has been high. Cane varieties that have given the farmers good returns are M.1900 Seedling, Q.970, Q.1121, Q.855, H.109, D.1135, Cheribon, and Uba. The lastnamed cane is, however, being displaced. Cane diseases, as far as could be observed, are not much in evidence, although in the case of old varieties still growing, but not as staple canes, gumming and "striped leaf disease" are apparent. Farmers are advised that as soon as they definitely decide a cane is of no use for their particular conditions, to get rid of it altogether and not allow inoculated stocks to grow on the outskirts of the farm, and in the farm garden. Neglect increases their susceptibility, and these canes become a menace to the healthy ones.

Methods of cultivation are uniformly good, although subsoiling would improve the drought-resisting properties of the soil, as well as better drainage and the more free advent of soil air. Green manure crops are recommended, as well as local experiment plots as a basis for more extensive fertilisation. Growers are also recommended to submit more samples of soil than they are doing to the Bureau for chemical analysis. While this latter process is by no means conclusive, it forms an excellent basis for local experiment.

CANE PEST COMBAT AND CONTROL.

The Entomologist, Sugar Experiment Stations (Mr. Edmund Jarvis), reports under date 24th November, 1922, as follows:—

Experiment Plots at Meringa.

The cane on these plots was cut during the second week in August, and the crop went about 18 tons to the acre, the c.c.s. being 8.14.

On the plot treated with naphthalene (150 lb. per acre) the cane sticks were straighter, and about 6 inches longer than those on the adjoining check plots. The application of chloride of lime, tobacco dust, and coal-tar gave negative results; the stools on these plots being practically the same height as those on controls alongside.

Where the soil had been sprayed with an emulsion of carbolineum and soap (carbolineum 2¼ pints, soap 3 lb., water 25 galls.) the cane was noticeably higher than anywhere else. Fifty per cent. of the sticks on this plot were standing, and about 10 per cent. of those on the adjoining check plot.

Owing to the crop as a whole having escaped serious damage from grubs, the results of our experiments with these surface deterrents were rendered inconclusive, although data of more or less economic value was obtained.

Injury from Moth-Borer.

Serious infestation by the Large Moth-Borer (*Phragmatiphila truncata, Walk.*) was noticed this season (August to October) among mature crops of Badila and D.1135 growing on lowlying ground near Aloomba. The caterpillars were found mostly near the top of the canes, and also occurred freely in central and basal portions.

From reports lately to hand, this most-pest appears to have been very much in evidence during the present season, both at Meringa and Gordonvale; owing probably to climatic conditions having proved unfavourable to the activities of its various parasitic enemies.

The chief natural controlling factor of *truncata* in the Cairns district is a tiny *Braconid* wasp (*Apanteles nonagriae, Oliff*) the life-cycle of which was studied

at our laboratory last December (see "Queensland Agricultural Journal, vol. xvii., p. 81), when it was found that its various stages (from egg to wasp) occupy a period of from 15 to 21 days.

This parasite was bred by Oliff in 1893, from caterpillars destroying cane in New South Wales; who, when reporting at that time, stated:—"After careful observation I have convinced myself that one of the chief, if not the chief, reasons that *Nonagria* (*Phragmatiphila*) has not spread more widely and done more damage on the Clarence is the fact that two minute and highly interesting parasites are present in such numbers as to keep it within reasonable limits. The most abundant of these parasites is *Apanteles nonagriae.*" The other parasite alluded to by Oliff is a chalcid wasp (*Euplectus howardi, Oliff*) which up to the present has not, to my knowledge, been found in Queensland. Several broods of *Apanteles* were reared by us last year for liberation at Ayr and Rita Island, on the Lower Burdekin; and we hope to continue this work next month, with a view to distributing these parasites on various selections in the Cairns district.

Fumigating Cane-Beetles.

Excavations made in canefields at Meringa and Highleigh early in September revealed the fact that grey-back beetles had emerged from the pupae, and were awaiting an opportunity to leave the soil.

Carbon bisulphide was injected at a depth of nine inches, immediately under the lines of stools, in twelve different places, the amounts given varying from two to eight drachms. When examined 24 hours later, 17 dead and 13 living beetles were found; all the live specimens, however, being located at distances exceeding nine inches from the actual spots of injection.

Notes on Para-Dichlorobenzene.

Since reporting on the possibilities of this fumigant in connection with cane-grub control, a letter has been received by the writer from the manufacturers in Germany, stating that for many years the firm of Fritz Schult, of Leipzig, have had the exclusive sale of the preparation in question, which they have lately put upon the market under the trade name of "Globol." At the present time it is largely used in wool-mills, magazines, and storehouses all over the world. "Globol" can be supplied by them in quantities of not less than 100 lb. at the rate of 1s. 3d. per lb., this price, however, being subject to fluctuation.

It would take 134 lb. of para-dichlorobenzene (costing at least £8 sterling) to treat an acre of cane with ¼-oz. injections on one side only of rows of cane standing five feet apart.

We may, of course, find as a result of field experiments to be carried out shortly, that ¼-oz. doses injected eighteen inches apart may prove effective, which would materially reduce the cost.

Victor Leggo and Co., of Melbourne, Victoria, who were hoping to be able to manufacture para-dichlorobenzene, have written to me (under date 5th October) stating:—"After making inquiries in England as to the price at which this compound could be delivered in Australia, we find that we could not possibly make it at a price which would be competitive. We have, therefore, abandoned the idea of making it."

When last reporting on the merits of this compound as a fumigant for cane-grubs ("Australian Sugar Journal," vol. xiv., p. 341) we stated that sets of Badila planted immediately over injections made in open ground at the laboratory had rooted in the contaminated soil, and the growth above ground at that date appeared normal. Subsequent development of these sets, however, did not prove satisfactory, and accordingly further tests were carried out during September and October with cane sets having single buds, which were planted both in pots and in the open.

As a crucial test a number of tins of soil, about 3½ inches square by 5 inches deep, were treated with ½-oz. injections placed immediately below small sets two inches long each having a single bud.

As might have been expected, the gas confined in this way had an injurious effect, owing probably to the fumes entering the cut ends of the sets. The eyes in some of the tins produced plants about 3 inches in height, which then stopped growing, owing to non-development of roots. It is worth noting that a cow-pea seed, which had not of course received any mechanical injury, germinated in one of these treated pots, producing a small plant which at present appears to be developing in a normal manner.

In an experiment started 16th October twelve stools of cane about 30 inches high were given ½-oz. injections placed just under the sets, and when examined after an interval of 24 days both the treated and control plants had noticeably increased in size.

Another experiment is being conducted in which the doses are placed from 4 to 6 inches from the stools, and on a level with or slightly below sets. This method, as already pointed out, admits of simple application, and we know that the fumes will penetrate the soil sufficiently to destroy the grubs.

With regard to future extensive field experiments with this chemical, the points we intend studying will relate (as mentioned in my annual report for 1921-22) chiefly to its effect on young growing cane roots and newly planted sets; while the influence exercised by heavy rain, temperature, closely packed volcanic soils, clay lands, &c., on the rate of evaporation and penetration of para-dichlorobenzene will also, doubtless, furnish data of economic interest.

Tachinid Parasite of Weevil-Borer.

The work of breeding fly parasites for future liberation on borer-infested plantations has been continued from month to month; this activity of our Experiment Station being second only in importance to research work in connection with cane-grub control.

During August last Mr. Cottrell Dormer, Assistant Entomologist, let go sixty tachinid flies at South Johnstone, and later (27th October) liberated eighty-four at Macknade, where arrangements have been made by us to collaborate with the mill manager, Mr. West, in this useful work. The Colonial Sugar Refining Company have always been keenly alive to the great economic importance of this fly-parasite (*Ceromasia sphenophori, Vill.*) as a natural controlling factor of the Beetle Borer. In 1913 they introduced it into Fiji, and being satisfied with results obtained there, sent an assistant entomologist to Queensland last year to establish a cage for breeding these flies at Macknade Mill. In view of the extensive area under sugar-cane in the Herbert River district, it was, as already mentioned, considered advisable that our Sugar Bureau should unite forces with the company, in order that parasites might be liberated at many different centres, and losses due to the borer be reduced throughout the cane area with as little delay as possible.

Goondi was visited this month (October), when on the 20th instant 26 parasites were given their liberty on Mr. Davis' farm at Daragee, the block retained by Mr. Davis for breeding the flies being well infested with borers.

Introduction of Digger-Wasp Parasites.

A third breeding-cage for rearing scoliid wasp-parasites, and additional numbers of tachinid flies, is just finished, and has a capacity of about 450 cubic feet. The Digger-wasps, which we hope to receive from Java about the beginning of January next, will be bred and ultimately liberated from this cage in canefields at Meringa and Gordonvale, where it is expected they will attack the grubs of our grey-back cockchafer. Details of this fascinating phase of grub control will be duly reported from month to month, after arrival of the first consignment of cocoons containing these parasitic wasps.

QUEENSLAND TREES.

By C. T. White F.L.S., Government Botanist, and W. D. Francis, Assistant Botanist.

No. 16.

Red Carabeen.

The Red Carabeen (*Weinmannia Benthami*) is a very common tree in the scrubs of the mountain ranges of Southern Queensland, such as the MacPherson Range. It is especially common on Robert's Plateau. In New South Wales it is found as far south as the Manning River. The tree is a large one, attaining a height of 120 feet and a barrel diameter of 3 feet. The barrel is often flanged at the base. The bark is grey, sometimes slightly wrinkled and marked by small warts. When cut it is seen to be deep red or brown in colour, but paler towards sapwood. It measures about ½-inch thick on a tree with a barrel diameter of 2 feet 6 inches. Up to the present the timber does not appear to be extensively used. It should be useful for general indoor work, such as fittings and cabinet-making.

Photo. by the Authors.]

PLATE 90.—RED CARABEEN (*Weinmannia benthami*).

A tree in the Ranges eastward of Emu Vale, Killarney District.

PLATE 91.—RED CARABEEN.
Showing leaves, flowers, and capsules (A).

Photo by Dept. Agriculture and Stock.]

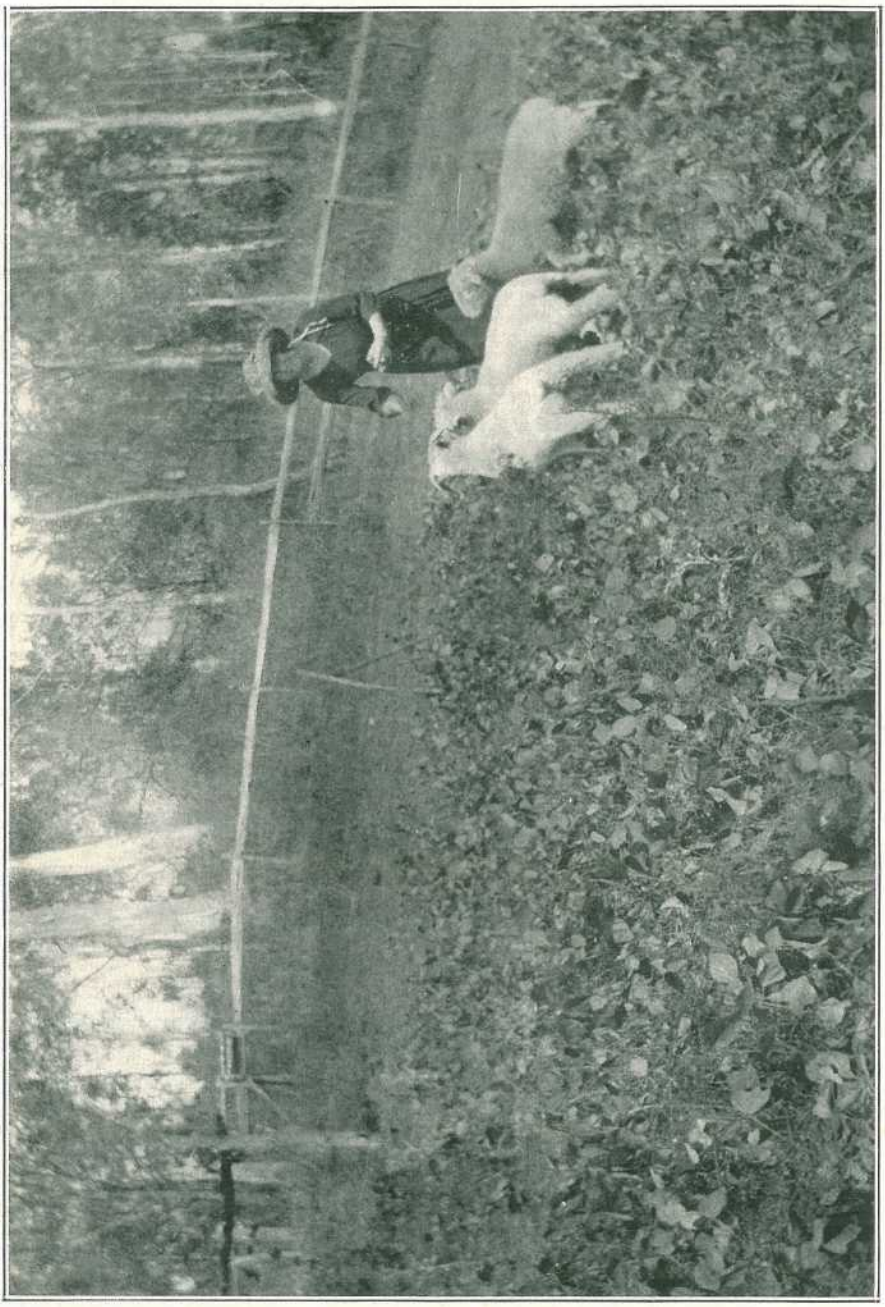

PLATE 92.—AN UNUSUAL RATION. MRS. HUGH MCMARTIN, OF PULLEN VALE, INDOOROOPILLY, FEEDING DORSET HORN LAMBS ON KUDZU LEAVES AND SWEET POTATOES.

WEEDS OF QUEENSLAND.

BY C. T. WHITE, Government Botanist.

No. 28.

THE JO JO WEED (*Soliva sessilis*)—A NEW LAWN PEST.

Description.—A small annual plant 1—4 inches in height bearing a profusion of burrs. Stems and leaves covered with rather long white hairs. Leaves about ½—1 inch long, the upper half finely divided, the lower half consisting of a long slender stalk. Flower-heads consisting of about 15—20 flowers, sessile in the leaf axils, ¼ inch across, surrounded at the base by 7—8 hairy bracts. Achenes ("seeds")

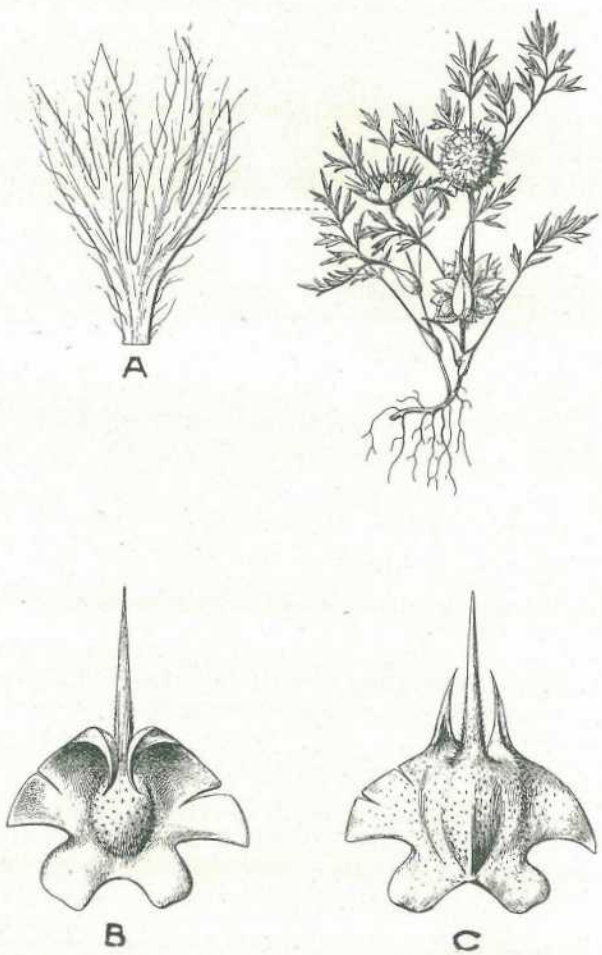

PLATE 93.—JO JO WEED (*Soliva sessilis*).

A, Leaf enlarged; B, Front view, and C, Back view of achene or "seed" much enlarged.

(After J. G. Baker in Martius' "Flora Brasiliensis.")

1 line long, tipped by a sharp, strong spine 1 line long, each "seed" winged at the sides and each wing terminating in an incurved tooth.

Each flower head consists of 7—9 male flowers and 9—12 females; each of these latter is capable of forming a spiny "seed" or achene, with the consequence that the flower head develops into a seed-head—a burr of 9—12 sharp spiny "seeds."

Distribution.—A native of Chili, South America. According to Mr. J. H. Maiden ("Agricultural Gazette" of N.S.W. XXVIII., 183) it first made its

appearance in Australia at the Cricket Ground, Moore Park, Sydney, 1899, and soon became so bad that patrons could no longer sit on the grass with comfort through it.

Specimens were brought to me last year by Mr. J. E. Young, of Graceville, Brisbane, who said that the plant was becoming a pest in that suburb, and this year the plant has made its appearance in several places about Brisbane. It seems to have a preference for lawns and short grass and is one of the worst lawn pests that has so far made its appearance in Queensland.

Botanical Name.—Soliva, named in honour of Salvator Soliva, a Spanish physician and botanist; *sessilis*, from the Latin referring to the closely sessile flower heads of "burrs."

Common Name.—"Jo Jo Weed," according to Mr. Maiden, is a local name in use in New South Wales.

Eradication.—Grass is more resistant to sprays than herbaceous plants as a general rule, and the Agricultural Chemist (Mr. J. C. Brünnich) recommends an application of a solution of common salt (¾ lb. to a gallon of water); if it is found to be too severe on the grass a good soaking of water should be given later to leach some of the salt away. Mr. Maiden states that in New South Wales it has been found that Buffalo Grass (*Stenotaphrum*) makes too heavy and coarse a mat for the weed to penetrate, with the consequence that there is no trouble with this weed in Buffalo Grass lawns.

Botanical Reference.—Soliva sessilis, Ruiz et pav.. Prodr. peruv 113 t. 24 et Syst. 215.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS FOR OCTOBER, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Bellona	Ayrshire ...	30 Aug., 1922	990	3·8	43·80	
Pretty Maid of Harelmar	,, ...	11 Sept., ,,	900	4·1	43·20	
College Meadow Sweet	Friesian ...	18 Sept., ,,	900	3·0	31·20	
Confidence ...	Ayrshire ...	13 Aug., ,,	690	3·8	30·90	
Magnet's Leda ...	Jersey ...	8 Feb., ,,	544	4·5	30·60	
Hedges Nattie ...	Friesian ...	20 May, ,,	660	3·9	30·00	
Yarraview Snowdrop	Guernsey ...	1 Sept., ,,	540	4·6	29·10	
College Cold Iron	Jersey ...	25 Jan., ,,	406	5·4	27·55	
Miss Betty ...	,, ...	17 May, ,,	450	4·9	25·80	
Thyra of Myrtleview	Ayrshire ...	22 Aug., ,,	690	3·2	25·50	
Songstress	,, ...	4 July, ,,	570	3·8	25·50	
Dawn of Warragaburra	Jersey ...	17 May, ,,	510	4·3	25·50	
Snowflake	Shorthorn...	20 Feb., ,,	570	3·8	25·50	
College Cobalt ...	Jersey ...	3 April, ,,	450	4·8	25·20	
Hedges Dutchmaid	Friesian ...	23 Sept., ,,	690	3·0	24·00	
Wattle Blossom ...	Guernsey ...	8 Sept., ,,	480	4·3	24·00	
College La Cigale	Jersey ...	10 July, ,,	420	4·5	22·20	
Fair Lassie ...	Ayrshire ...	1 Sept., ,,	570	3·3	21·90	
Dear Lassie ...	,, ...	19 June, ,,	540	3·5	21·90	
La Hurette Hope	Jersey ...	30 June, ,,	420	4·4	21·60	
College St. Margaret	,, ...	16 June, ,,	360	5·0	21·00	
Prim	Friesian ...	6 Feb., ,,	544	3·3	20·74	
Miss Fearless ...	Ayrshire ...	30 May, ,,	540	3·2	20·10	
Netherton Belle ...	,, ...	19 July, ,,	450	3·8	20·10	
College Ma Petite	Jersey ...	5 Feb., ,,	390	4·4	20·10	

Rainfall for the Month, 166 points.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, OCTOBER, 1922.

The report by the principal (Mr. Cuthbert Potts) on the egg-laying competition of the Queensland Agricultural College at Gatton for October, states:—Extremely hot winds were experienced during the month, and these considerably upset the laying of some of the heavy breeds and made them resort to the broody coops. In the light section the highest scores for the month were:—N. A. Singer, 168; C. H. Singer, 166; and R. Gill, 158 eggs. In the heavy breeds, R. Burns came first with 158; C. C. Dennis 140 next, followed by E. F. Dennis with 136 eggs. Mr. N. A. Singer's B. bird finished her last month's break of 52, and Mr. R. Burn's D. bird has an unbroken run 23 eggs to her credit. The following are the individual scores:—

Competitors.	Breed.	Oct.	Total.
LIGHT BREEDS.			
*N. A. Singer	White Leghorns	168	915
C. H. Singer	Do.	166	882
*W. and G. W. Hindes	Do.	148	834
*Bathurst Poultry Farm	Do.	146	769
*T. Fanning	Do.	141	735
*G. Trapp	Do.	151	733
*R. Gill	Do.	158	732
*W. A. Wilson	Do.	143	728
*Mrs. L. Andersen	Do.	145	726
J. H. Jones	Do.	143	726
*S. L. Grenier	Do.	149	726
*J. M. Manson	Do.	149	721
*W. Becker	Do.	147	711
*H. P. Clarke	Do.	151	706
A. G. C. Wenck	Do.	135	704
*J. W. Newton	Do.	154	694
*G. Williams	Do.	136	676
*R. C. Cole	Do.	144	676
*O. Goos	Do.	138	669
*C. Goos	Do.	144	665
*Oakleigh Poultry Farm	Do.	148	659
*H. Fraser	Do.	147	657
*Mrs. R. Hodge	Do.	139	648
B. Hawkins	Do.	121	642
*J. W. Short	Do.	140	627
*R. C. J. Turner	Do.	155	627
*M. F. Newberry	Do.	151	623
J. Purnell	Do.	113	623
*Mrs. E. White	Do.	133	615
*C. M. Pickering	Do.	138	611
*Thos. Taylor	Do.	134	611
A. Maslin	Do.	100	606
N. J. Nairn	Do.	134	601
*F. Birchall	Do.	145	593
T. H. Craig	Do.	116	592
E. Stephenson	Do.	133	583
*E. A. Smith	Do.	125	570
G. F. Richardson	Do.	121	569
E. Symons	Do.	124	561
B. C. Bartlem	Do.	120	554
A. Anders	Do.	127	520
H. Trappett	Brown Leghorns	132	501
Brampton Poultry Farm	White Leghorns	113	488
Parisian Poultry Farm	Brown Leghorns	112	332

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Oct.	Total.
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	158	808
*A. E. Walters	Do.	131	777
*T. Hindley	Do.	130	734
*R. Holmes	Do.	123	716
*H. M. Chaille	Do.	110	706
Mrs. A. Kent	Do.	122	685
*C. C. Dennis	Do.	140	685
Jas. Hutton	Do.	120	676
*E. F. Dennis	Do.	136	651
Mrs. A. E. Gallagher	Do.	128	637
R. Innes	Do.	136	625
*Jas. Potter	Do.	108	603
H. B. Stephens	Do.	145	587
W. Becker	Chinese Langshans ...	123	570
*Rev. A. McAllister	Black Orpingtons ...	100	570
Mrs. L. Maund	Do.	100	569
V. J. Rye	Do.	104	556
C. Doan	Do.	127	554
Wambo Poultry Farm	Do.	104	554
*Parisian Poultry Farm	Do.	115	549
Jas. Hitchcock	Do.	113	543
C. Rosenthal	Do.	109	497
W. C. Trapp	Do.	73	430
R. Burns	Silver-laced Wyandottes	92	427
*J. E. Smith	Barred Rocks	87	387
Miss L. Hart	Rhode Island Reds ...	113	290
Total	...	9,125	44,127

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
N. A. Singer	136	171	143	156	154	155	915
W. and G. W. Hindes	149	133	144	134	147	127	834
Bathurst Poultry Farm	103	108	137	139	153	127	769
T. Fanning	91	150	132	132	151	79	735
Geo. Trapp	133	113	118	131	114	124	733
R. Gill	135	131	137	117	100	112	732
W. A. Wilson	118	112	101	134	127	136	728
Mrs. L. Andersen	144	99	126	119	118	120	726
S. L. Grenier	121	89	127	127	129	133	726
J. M. Manson	122	108	128	106	135	122	721
W. Becker	115	90	130	117	124	135	711
H. P. Clarke	121	103	124	130	112	116	706
J. W. Newton	138	116	131	96	123	90	694
G. Williams	106	116	130	113	110	101	676
R. C. Cole	128	114	126	86	111	111	676
O. Goos	111	95	123	132	117	91	669
C. Goos	87	97	100	122	143	116	665
Oakleigh Poultry Farm	122	102	114	98	99	124	659
H. Fraser	113	122	112	100	96	114	657
Mrs. R. Hodge	133	81	109	102	127	96	648
J. W. Short	108	104	124	88	90	113	627

EGG-LAYING COMPETITION—*continued.*

DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS—*continued*							
R. C. J. Turner	113	95	118	112	110	79	627
M. F. Newberry	113	82	74	133	97	124	623
Mrs. E. White	117	40	123	79	134	122	615
C. M. Pickering	124	120	78	97	108	84	611
Thos. Taylor	121	90	107	103	100	90	611
F. Birchall	102	113	74	62	128	114	593
E. A. Smith	107	87	110	101	79	86	570
HEAVY BREEDS.							
R. Burns	127	136	121	147	140	137	808
A. E. Walters	130	118	105	130	151	143	777
T. Hindley	103	125	79	166	162	99	734
R. Holmes	91	149	121	120	109	126	716
H. M. Chaille	135	115	132	110	126	88	706
C. C. Dennis	112	126	118	102	122	105	685
E. F. Dennis	108	107	131	56	120	129	651
J. Potter	98	100	111	100	119	75	603
Rev. A. McAllister	101	117	123	71	39	119	570
Parisian Poultry Farm	68	91	103	69	107	111	549
J. E. Smith	43	80	54	54	72	84	387
Miss L. Hart..	55	58	45	57	27	48	290

CUTHBERT POTTS, Principal.

HOME TANNING—II.*

Numerous requests have reached the Department of Agriculture and Stock for directions for tanning hides on a small scale. Usually the tanning of a few hides or skins by inexperienced persons or those lacking adequate facilities cannot be recommended from the view point either of national economy or of individual profit. Sometimes, however, circumstances arise when a knowledge of tanning is of particular value on the farm. From time to time various methods of tanning have been described in the Journal. The latest information, containing possibly some new ideas, we have is embodied in D.C. 230 of the U.S. Department of Agriculture on "Home Tanning," issued in July of this year, and from which the following notes are abstracted. The first part was published in the November Journal.—Ed.

CHROME-TANNED LEATHER.

Read the directions through before starting this work.

For many purposes chrome-tanned leather is considered to be as good as the more generally known bark- or vegetable-tanned leather. The chrome process, which requires only a few weeks as against as many months for the bark-tanning process, derives its name from the use of chemicals containing chromium or "chrome." It is a chemical process requiring care and attention. It is felt, however, that by adhering strictly to the directions here given, never disregarding details which may seem unimportant, a satisfactory and serviceable leather can be produced in a comparatively short time. The saving in time seems sufficient to justify a trial of the procedure.

Slaking Lime.

For each hide, and for not more than three small skins, put 8 pounds of lump, burnt, or caustic lime in a clean half barrel, wooden tub, or bucket, of at least 5 gallons capacity. Use only good-quality lime, free from dirt and stones

*Department Circular 230, by R. W. Frey, I. D. Clarke, and F. P. Veitch, Bureau of Chemistry, United States Department of Agriculture (July, 1922).

and never air-slaked. To the lime add about 1 quart of water. As the lime begins to slake, add more water, a little at a time, to keep the lime moist; do not pour in enough water to quench the slaking. After the lime appears to be slaked, stir in 2 gallons of clean water. Do all this just exactly as you would make whitewash. Slake the lime on the same day that you start soaking the hide or skin, and keep the limewater covered with boards or sacks until ready to use.

If available, fresh hydrated lime, not air-slaked, may be used instead of slaking burnt or caustic lime. In this case use 10 pounds in 4 or 5 gallons of water.

Soaking and Cleaning.

If the hide has been salt-cured, shake it vigorously to remove most of the salt. Spread it out, hair side down, and trim off the tail, the head back of the ears, shanks, and all ragged edges.

Now swing the hide or skin, hair side up, lengthwise, over a smooth log or board, and, with a sharp knife, split it from neck to tail, straight down the backbone line, into two half hides, or "sides." If the hide is large or "spready," it is more convenient to split each side lengthwise into two strips, making the strip with the backbone edge about twice as wide as the belly strip. Thus a whole hide will give two sides or four strips. In these directions the word "side" should be taken to mean either side or strip, as the case may be.

For a medium or large hide fill a clean 40- to 50-gallon barrel with clean, cool water; for a small skin a half-barrel or tub may be used. Hang the sides over sticks or pieces of rope and suspend them in the barrel of water to soak for two or three hours. Stir them about frequently to soften, loosen, and wash out the blood, dirt, manure, and salt. (The sticks or pieces of rope may be held in the proper position by tying a loop of cord on each end and catching the loops over nails in the outside of the barrel near the top.) After soaking for about three hours, take out the sides and place them, one at a time, hair side up, over a "beam." (A ready-made beam can be purchased, but a fairly satisfactory one can be made from a very smooth slab, log, or thick planed board, from 1 to 2 feet wide and 6 to 8 feet long. The slab or log is inclined, with one end resting on the ground and the other extending over a box or trestle so as to be about waist high.) With the side lying hair side up over the beam, scrub off all dirt and manure, using if necessary a stiff brush; then wash off with several bucketfuls of clean water.

Now turn the side over, flesh side up, and scrape or cut off any flesh remaining. Work over the entire flesh side with the back edge of a drawing or butcher knife, held firmly by both ends while pushing away from you hard against the hide or skin. Wash off with a bucket or two of clean water. This working over should always be done, as it helps to soften the hide. Refill the soak barrel with clean, cool water, and hang the sides in it as before, working them about frequently until they are soft and flexible. A green or fresh hide usually needs to be soaked for not more than 12 to 24 hours; a green salted hide for not more than 24 to 48 hours.

When the sides are properly softened, that is, about like a fresh hide or skin, throw them over the beam, and again work over the flesh side with the back edge of a knife as directed before.

Hides and skins must be soft, pliable, and clean all over before being put into the lime.

Liming to Remove the Hair.

Wash out the soak barrel and pour into it all of the slaked lime. Nearly fill the barrel with clean, cool water, and stir thoroughly. Hang the sides again over the short sticks or pieces of rope, hair side out, and suspend them in the barrel so that they are completely covered by the limewater. Cover the barrel with boards or bags. Plunge the hides and stir the limewater three or four times each day until the hair will come off easily. This will take from 6 to 10 days in summer and from 6 to 16 days in winter. When thoroughly limed, the hair can be rubbed off readily with the hand. Early in the liming process it will be possible to pull out the hair, but the hide must be left in the lime until the hair comes off by rubbing over with the hand.

When limed, throw the sides, hair side up, over the beam, and, with the back edge of a drawing or butcher knife, held nearly flat against the hide, push off the hair from all parts of the hide. If the hide is sufficiently limed, a curdy or cheesy layer of skin rubs off with the hair. If this layer does not rub off, the sides must be returned to the limewater. Now thoroughly work over the grain or hair side with a dull-edged tool to get out as much lime, grease, and dirt as possible. Then turn the side over and do the same thing, being sure to remove all fleshy matter.

Shave down to the hide itself, but be careful not to cut into it. Remove the flesh by scraping or by using a sharp knife with a motion like that of shaving your face. Rinse off both sides of the hide with clean water.

For sole, belting, and harness leathers, soak and wash the hide in cool water for about six hours, changing the water four or five times, and then proceed as directed under "Drenching."

For strap, upper, and thin leathers, put the limed white hide or skin into a wooden or fibre tub of clean, lukewarm (about 90 deg. F.) water for four to eight hours, depending upon the size of the hide or skin, and stir about occasionally. Be sure not to get the water too hot, never so hot that it is uncomfortably warm to the hand. After this treat the hide or skin as directed under "Drenching."

The lime, limewater, sludge, and fleshings from the liming process may be used as fertilizer, being particularly good for acid soils. The hair, as it is scraped from the hide, may be collected separately, and, after being rinsed several times, may be used in plastering. If desired, it can be thoroughly washed with many changes of water until absolutely clean and, after drying out in a warm place, can be used for padding, upholstering, insulation of pipes, etc.

Drenching.

Drenching is necessary to remove the lime which the hide or skin still contains and to make it soft and pliable.

For each large hide or skin buy 3 ounces of U.S.P. lactic acid (or 9 ounces of tannery 22 per cent. lactic acid). Nearly fill a clean 40- to 50-gallon barrel with clean, cool water, and stir in the lactic acid, mixing thoroughly with a paddle. Suspend the sides in this solution for 24 hours or overnight, plunging them up and down occasionally.

For light skins, weighing less than 15 pounds, use only 1 ounce of U.S.P. lactic acid in about 20 gallons of water.

If lactic acid cannot be obtained, use 1 pint of vinegar for every ounce of lactic acid. An effort should be made to get the lactic acid, for vinegar will not be as satisfactory, especially for the medium and smaller skins.

After drenching, work over both sides of the hide or skin, as directed under "Liming."

For sole, belting, and harness leathers, hang the sides in a barrel of cool water overnight; then proceed as under "Tanning."

For thin, softer leathers from the small skins, simply rinse off with water after working from the drench. Do not soak in water overnight, but proceed to the "Tanning."

Tanning.

The tanning solution should be made up at least two days before it is to be used; that is, not later than when the hide or skin is taken from the limewater for the last time.

Remember that this is a chemical process and all materials must be of good quality and accurately weighed, and that the specified quantities of water must be carefully measured.

The following chemicals are required: Chrome alum (chromium potassium sulphate crystals); soda crystals (crystallized sodium carbonate); and common salt (sodium chlorid). Insist upon pure chemicals of U.S.P. quality. Get them from the nearest drug store or find out from it the address of a chemical manufacturing concern which can supply you.

For each hide or skin weighing over 30 pounds, use the following quantities for the stock chrome solution:

Dissolve 3½ pounds of soda crystals (crystallized sodium carbonate) and 6 pounds of common salt (sodium chlorid) in 3 gallons of warm, clean water in a wooden or fibre bucket. The soda crystals must be clear or glasslike. Do not use the white crusted lumps. *This is important.*

At the same time dissolve, in a large tub or half barrel, 12 pounds of chrome alum (chromium potassium sulphate crystals) in 9 gallons of cool, clean water. This will take some time to dissolve and will require frequent stirring. Here again it is important to use only the very dark, hard, glossy purple or plum-coloured crystals of chrome alum, not the lighter, crumbly, dull lavender ones.

When the chemicals are dissolved, which can be told by feeling around in the tubs with a paddle, pour the soda-salt solution slowly in a thin stream into the

chrome-alum solution, stirring constantly. Take at least 10 minutes to pour in the soda solution. This should give one solution of about 12 gallons which is the *stock chrome solution*. Keep this solution well covered in a wooden or fibre bucket, tub, or half barrel.

To start tanning, pour one-third (4 gallons) of the stock chrome solution into a clean 50-gallon barrel and add about 30 gallons of clean, cool water; that is, fill the barrel about two-thirds full. Thoroughly mix the solution in the barrel and suspend in it the sides taken from the drenching. Work the sides about and stir the solution frequently, especially the first two or three days. This helps to make the sides evenly coloured and should be done every hour or so throughout the first day. Keep the suspended sides as smooth as possible.

After three days, temporarily remove the sides from the barrel, add one-half of the remaining stock chrome solution, thoroughly mixing it with that in the barrel, and again hang in the sides. Move the sides about and stir the solution three or four times each day.

After three more days, again temporarily remove the sides, and pour into the barrel the rest of the stock chrome solution, thoroughly mixing it with that in the barrel, and again hang in the sides. Move the sides about and stir frequently as before.

After three or four days in this solution, cut off a small piece of the thickest part of the hide, generally in the neck, and examine the freshly cut edge of the piece. If the hide seems to be evenly coloured greenish or bluish all the way through, the tanning is about finished. Boil the small piece which you have just cut off in water for a few minutes. If it curls up and becomes hard or rubbery, the tanning is not completed and the sides must be left in the tanning solution for a few days more, or until a small piece when boiled in water is changed little if at all.

The foregoing quantities and directions have been given for a medium or large hide. For smaller hides and skins the quantities of chemicals and water can be reduced. For each hide or skin weighing less than 30 pounds, or for two or three small skins together weighing not more 30 pounds, the quantities of chemicals may be cut in half, giving the following solutions:

For the soda-salt solution dissolve 1¾ pounds of soda crystals (crystallized sodium carbonate) and 3 pounds of common salt (sodium chlorid) in 1½ gallons of clean water.

For the chrome-alum solution dissolve 6 pounds of chrome alum (chromium potassium sulphate crystals) in 4½ gallons of cool, clean water.

When the chemicals have dissolved pour the soda-salt solution slowly into the chrome-alum solution as already described. This will give one solution of about 6 gallons which is the *stock chrome solution*. For the lighter skins tan with this solution, exactly as directed for medium and large hides, adding one-third, that is, 2 gallons of this stock chrome solution, each time, and begin to tan in about 15 gallons of water instead of 30 gallons. Follow the directions already given as to stirring, number of days, and testing to determine when tanning is completed. Very small, thin skins probably will not take as long to tan as will the large hides. The boiling-water test is very reliable for showing when the hide is tanned.

Washing and Neutralizing.

When the hide or skin is tanned, take the sides out of the tanning solution and put them in a barrel of clean water. The barrel in which the tanning was done can be used after it has been thoroughly washed. (When emptying the tanning barrel be sure to carefully dispose of the tanning solution. While this solution is not poisonous to the touch, it would probably be fatal to the animals and stock of the farm should they drink it, and is furthermore harmful to the soil.) Wash the sides in about four changes of water. For medium and large hides, dissolve 2 pounds of borax in about 40 gallons of clean water and soak the sides in this solution overnight. For smaller hides and skins, weighing less than 25 pounds, use 1 pound of borax in about 20 gallons of water. The sides or skins should be moved about in the borax solution as often as feasible. After soaking overnight in the borax solution, remove the sides and wash them for an entire day, changing the water 5 or 6 times. Take the sides out, let the water drain off, and proceed as under "Dyeing black." If it is not desired to blacken the leather, proceed as under "Oiling and finishing."

Dyeing Black.

Water-soluble nigrosine.—One of the simplest and best means of dyeing black is with nigrosine. Make up the dye solution in the proportion of a half ounce of water-soluble nigrosine dissolved in 1¼ pints of water. Be sure to get water-soluble

nigrosine. Evenly mop or brush this solution over the wet chrome leather after draining as already directed and then proceed as directed under "Oiling and finishing."

Iron liquor and sumac.—If water-soluble nigrosine cannot be obtained, a fairly good black can be produced with iron liquor and sumac. To make the iron liquor, mix clean iron filings or turnings with a half gallon of good vinegar and let stand for several days. See that there are always some undissolved filings or turnings in the vinegar. For a medium or large hide, put 10 to 15 pounds of dried, crumbled sumac leaves in a barrel containing 35 to 40 gallons of warm water. Stir well, and, when cool, hang in it the wet, chrome-tanned sides. Leave the sides in this solution for about two days, plunging and mixing the solution frequently. Take out the sides, rinse off all particles of sumac, and evenly mop or brush over with the iron liquor. Rinse off the excess of iron liquor and put the sides back in the sumac overnight. If not sufficiently black the next morning, mop over again with iron liquor, rinse, and return to the sumac solution for a day. Take out of the sumac, rinse well, and scrub thoroughly with warm water. Finally wash the sides for a few hours in several changes of water.

While both of these formulas for blackening have been given, it is recommended that water-soluble nigrosine be used whenever possible, as the iron liquor and sumac formula is somewhat troublesome and may produce a cracky grain. After blackening, proceed as under "Oiling and finishing."

Oiling and Finishing.

Thin leather.—Let the wet tanned leather from the dyeing, or from neutralizing if not dyed, dry out slowly until very damp. Then go over the grain side with a liberal coating of neat's-foot or cod oil. While still damp, tack the sides out on a wall or tie in a frame, being sure to pull out tight and smooth, and leave until dry. When dry, take down and dampen well by dipping in warm water or by rolling up in wet sacking or burlap. When uniformly damp and limber, go over the sides with a "slicker," working them out on the grain side in all directions. (A slicker can be made from a piece of copper or brass about one-fourth inch thick, 6 inches long, and 4 inches wide. One long edge of the slicker is mounted in a wooden handle and the other long edge, well rounded, is used to work over the sides by pushing hard against them and away from yourself.) After slicking, it may be necessary to "stake" the leather. That is done by pulling the damp leather vigorously back and forth over the end of a small smooth board about 2½ feet long, 6 inches wide, and 1 inch thick, fastened upright and braced to the floor or ground. The top end of the board must be shaved down to a wedge shape, with the edge not more than one-eighth inch thick and the corners well rounded. Pull the sides or skins backward and forward over this edge, flesh side down, exactly as a cloth is worked back and forth in polishing shoes. Let the sides dry out thoroughly again, and, if not sufficiently soft and pliable, dampen with water, apply more oil, and slick and stake as before. The more time given to slicking and staking, the smoother and more pliable the leather will be.

Thick leather.—Thick leather from the larger hides is oiled and finished in a slightly different manner. For harness and strap leather let the tanned sides, dyed if desired, dry down until still quite damp. Then slick over the grain side thoroughly and apply a liberal coating of neat's-foot or cod oil. Tack on a wall or tie in a frame, stretching the leather out tight and smooth, and leave until dry. Then take down, dampen with warm water until limber and pliable, and apply to the grain side a thick coating of a dubbin made by melting together about equal parts of cod oil and tallow or neat's-foot oil and tallow. This dubbin when cool must be soft and pasty but not liquid. If too nearly liquid, add more tallow. Hang up the sides again and leave until thoroughly dried. When dry, remove the tallow from the surface of the leather by working over with the slicker. If more grease in the leather is desired, dampen again and apply another coating of the dubbin. When again dry, slick off the tallow and thoroughly work over all parts of the leather with the slicker. Rubbing over with sawdust will help to take up any surface oiliness.

Chrome-tanned leather is inclined to be stretchy, so that in cutting up the leather for use in harness, straps, reins, and similar articles it is best to first take out most of the stretch.

Chrome leather for shoe soles must be heavily greased, or, in other words, waterproofed, unless it is to be worn in extremely dry sections of the country. Waterproofing may be done after repairing the shoes by setting them in a shallow pan of oil or grease, so that just the soles are covered by the grease. The soles should be dry before setting them in the melted grease. Melted paraffin wax will do, although it makes the soles stiff. The simple formulas given on page 11 are satisfactory for waterproofing chrome sole leather.

ALUM-TANNED LACE LEATHER.

Lace leather should be made from good sound hides, preferably steer hides. The weight of the hides used may vary from 20 to 40 pounds, depending upon the thickness of leather desired.

Slacking Lime.

Place about 6 pounds of burnt or caustic lime in a clean wooden tub. Add about 1 quart of water. As the lime begins to slake, add more water, a little at a time, to keep the lime moist; do not pour in water enough to quench the slaking. After the lime appears to be slaked, stir in a gallon or two of clean water. Do all this just exactly as you would make whitewash. Slake the lime the day you start soaking the hide, and keep the tub covered until used.

If burnt lime is not available, fresh hydrated lime (not air-slaked) may be used. In this case stir 8 pounds of hydrated lime into a barrel of water and proceed as directed under "Liming."

Soaking and Cleaning.

If the hide has been salted, shake vigorously to remove most of the salt. Spread it out, hair side down, and trim off the tail, head, ears, all ragged edges, and shanks.

Place the hide, hair side up, lengthwise, over a log or board, and, with a sharp knife, cut it from nose to tail, straight down the backbone line, into 2 "sides." It will be more convenient in subsequent handling, especially when the hide is large, to then split each side lenthwise into 2 strips. The back strip will make the better leather and should be about twice as wide as the belly strip.

Fill a barrel with clean, cool water. Place the strips in the barrel to soak for two or three hours, with frequent stirring, to soften the sides and loosen and soak out the blood, dirt, manure, and salt. Take the strips out of the barrel and place them, one at a time, hair side up, on a smooth slab, log, or thick planed board, from 1 to 2 feet wide and 6 to 8 feet long, one end of which rests on the floor and the other extends over a box or trestle so as to be about waist high. Scrub off all dirt and manure, and wash with several bucketfuls of clean water.

Now turn the strip over, flesh side up, and carefully cut off most of the meat or flesh. Work over the entire flesh side with the back edge of a drawing or butcher knife, held firmly by both ends, while pushing away from you hard against the strip. Wash off with a bucket or two of clean water. This working over should always be done. Refill the barrel with clean, cool water and put the strips back. Pull them up and stir frequently until they are soft and flexible. A green hide usually needs to be soaked for not more than 10 to 20 hours; a green salted hide for not more than 20 to 40 hours.

When the strips are properly softened, throw them over the slab or beam and thoroughly scrape off all remaining flesh or meat with the back edge of the drawing or butcher knife. It is of the greatest importance to remove all of this meat. When it can not be scraped off, cut it off, but be very careful not to cut into the hide itself. Even should there appear to be no flesh to take off and nothing appears to be removed, it is necessary to thoroughly work over the flesh side in this way with the back of the knife.. Finally wash off with a bucketful of clean water.

Liming to Remove the Hair.

Wash out the soak barrel. Pour in the slaked lime; nearly fill the barrel with clean, cool water; and stir thoroughly. Hang each strip, hair side up, over a separate piece of rope and suspend in the limewater. Fasten the ends of the ropes to the barrel so that the strips are entirely covered by the limewater, and cover the barrel with a bag or board. Pull up the strips and stir the lime three or four times each day until the hair will rub off easily from all parts of each strip. This will take from 5 to 8 days in summer and from 6 to 16 days in winter.

When limed, throw the strips, hair side up, over a smooth, slanting slab or board, and, with the back of a drawing or butcher knife, held nearly flat against the hide, push the hair off. If the hide is sufficiently limed, a curdy or cheesy layer of skin rubs off with the hair. If this layer does not thus rub off, the strips must be returned to the limewater. After removing the hair, put the strips back in the lime for another day, until any fine hairs that may remain can be easily rubbed off. Now thoroughly work over the grain or hair side with the back of the knife

to "scud" out as much lime, fat, and dirt as possible. Turn the strip over and do the same thing, being sure to remove any meat that may remain on the hide. Then throw the strips into a wooden or fibre tub of clean, lukewarm water and let them remain for from six to eight hours, stirring occasionally.

Drenching.

Drenching is necessary to remove the lime which the hide still contains and to make it soft and pliable.

Buy 3 ounces of U.S.P. lactic acid at the drug store. Nearly fill a clean barrel with clean, cool water, and stir the 3 ounces of lactic acid into it with a clean paddle. Take the strips out of the tub of water, throw them into the barrel of acid, and pull up and stir frequently for 10 to 12 hours or overnight. Now work over or "scud" thoroughly both sides of each strip as is directed under "Liming," and put them in a tub of cool, clean water.

Lactic acid helps to make a softer leather, but if it cannot be bought use ½ gallon of vinegar instead.

Tanning.

While the strips are being drenched, thoroughly wash out the barrel in which the hide was limed. Place in it 15 gallons of clean water and 12 pounds of ammonia alum, or potash alum, and stir frequently until it is completely dissolved.

Dissolve 3 pounds of washing soda (crystallized sodium carbonate) and 6 pounds of salt in 5 gallons of cold, clean water in a wooden bucket. The soda crystals must be clean and transparent (glasslike). Do not use white opaque lumps.

Now pour the soda solution into the alum solution in the barrel very, very slowly, stirring the solution in the barrel constantly. Take at least 10 minutes to pour in the soda solution in a small stream. If the soda is poured in rapidly the solution will become milky, and it will not tan. The solution should be cool, and enough water should be added to nearly fill the barrel.

Hang each well-washed strip from the drench in the alum-soda solution. Pull up the strips and stir the solution six to eight times each day . (Do not put the bare hands in the liquor if they are cut or cracked or have sores on them. The alum will make them worse.)

After six or seven days, remove the strips from the alum-soda solution and rinse well for about one-fourth hour in clean, cold water. Drain on clean boards for one-half hour; then hang up by one edge to dry in a moderately warm place free from draughts. Turn the strips every hour, so that first one edge and then the other is up. If this is not done, the lower edge may become cracky. Be sure not to let the strips dry completely and become stiff. If one part of the strip dries faster than another, which is especially likely to occur on the edges, moisten these drier places with water.

While the strips are yet damp but have become somewhat stiff, about like a bridle or driving rein, and can be sharply bent without cracking, begin to work or "stake" them. That is, pull them vigorously back and forth lengthwise over the end of a small smooth board, about 2½ feet long, 6 inches wide, and 1 inch thick, fastened upright and braced to the floor or ground. The top end of the board must not be more than one-eighth inch thick and the corners must be well rounded. Pull the strip backward and forward, flesh side down, exactly as a cloth is worked backward and forward in polishing shoes. Do this vigorously, but do not cut holes in the hide. The strips must be staked very thoroughly all over in order to make them pliable and soft. The more time given to staking, the more pliable the lace leather will be. The staking must be done in a clean place where the strips will not get dirty.

After staking, lay the strips flat on a large, low table or on smooth boards, grain side down, and go over the flesh side thoroughly with the back of the knife, or better, with a piece of wedge-shaped hickory, about 6 inches square and one-half inch thick at the head of the wedge. The narrow end of the wedge should be from one-thirty-second to one-sixteenth inch thick and very smooth. Work the flesh side of the hide with this slicker, holding it in both hands by the top and pushing away from you, to remove all adhering flesh and dirt. Turn the strip over and work the grain side also.

Melt together 3 pounds of tallow and 1 pint of neat's-foot, cod, or fish oil. While the strips are still soft and uniformly damp (if they are not damp at this stage, cover them in damp sawdust until they are uniformly moist all over, but not wet). Rub a heavy coat of the melted grease mixture all over both sides of each

strip. This should be done in a very warm place, and the grease should be as hot as the hand can bear without discomfort.

Roll the greased strips together and keep them in a very warm place for two or three days. Unroll and again stake thoroughly. If too dry and stiff to stake readily, cover them with damp sawdust until they are soft enough. After drying, if the leather is not sufficiently soft and pliable, again apply dubbin to both sides exactly as before, and lay away rolled for two days. Again stake and then work over both sides with the hickory slicker to more thoroughly work in the grease and remove the excess.

The strips should now be very supple and pliable, even after they are thoroughly dried out. If they are not, they must be vigorously and thoroughly staked all over and redubbed with oil only, staked, and slicked, until they remain soft and pliable. Thorough, vigorous staking of the nearly dry leather is absolutely essential to produce the desired softness and pliability. When dry, soft, and pliable, the leather is ready for use.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING OCTOBER 1922 AND 1921 FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Oct.	No. of Years' Records.	Oct., 1922.	Oct., 1921.		Oct.	No. of Years' Records.	Oct., 1922.	Oct., 1921.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	0·99	21	0·87	2·65					
Cairns	2·01	40	1·33	3·96	Nambour	3·15	26	0·49	1·82
Cardwell	2·08	50	1·69	5·31	Nanango	2·31	40	1·40	0·99
Cooktown	1·15	46	0·10	1·59	Rockhampton ...	1·90	35	2·47	3·35
Herberton	0·96	35	0·58	2·89	Woodford	2·61	35	2·00	1·20
Ingham	1·63	30	3·30	4·91					
Innisfail	3·05	41	2·90	5·59					
Mossman	3·21	14	1·96	4·10	*Darling Downs.*				
Townsville	1·28	51	1·89	5·78					
					Dalby	2·11	52	1·35	1·36
Central Coast.					Emu Vale... ...	2·32	26	1·11	1·78
					Jimbour	1·85	34	1·74	1·02
Ayr	1·02	35	0·95	3·57	Miles	1·99	37	1·64	1·29
Bowen	1·08	51	0·18	3·41	Stanthorpe ...	2·63	49	1·55	4·16
Charters Towers ...	0·72	40	0·05	3·29	Toowoomba ...	2·66	50	1·50	1·33
Mackay	1·87	51	1·76	1·79	Warwick	2·35	57	1·59	2·57
Proserpine	1·85	19	0·97	2·88					
St. Lawrence ...	1·88	51	0·23	2·08					
					Maranoa.				
South Coast.									
					Roma	1·75	48	3·40	1·87
Biggenden	2·30	23	1·22	1·83					
Bundaberg	2·14	39	0·80	0·80	*State Farms, &c.*				
Brisbane	2·62	71	2·10	1·36					
Childers	2·48	27	0·33	1·47	Bungeworgorai ...	1·31	8	2·27	1·23
Crohamhurst ...	3·45	29	1·40	1·93	Gatton College ...	2·25	23	..	0·67
Esk	2·43	35	4·78	1·08	Gindie	1·39	23	2·15	0·40
Gayndah	2·41	51	0·73	0·89	Hermitage ...	1·99	16	1·59	2·50
Gympie	2·76	52	0·50	2·61	Kairi	1·26	8	...	2·66
Glasshouse Mts. ...	2·86	14	1·80	11·67	Sugar Experiment Station, Mackay	1·71	25	1·45	1·60
Kilkivan	2·67	43	0·18	1·97	Warren	2·60	8	0·75	1·10
Maryborough ...	2·74	51	0·29	0·73					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for October this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

FACTORS IN AN IDEAL RATION.

BY J. McLEAN WILSON.

Mr. Wilson is an American authority on stock feeding and breeding and the owner of a Holstein herd. He is in Australia on a health tour, and is at present visiting Queensland.—Ed.

In actually computing a ration for a given purpose there are seven factors that should be considered—

1. Amount of dry matter.
2. Digestibility of the ration.
3. The nutritive ratio.
4. Variety of the ration.
5. Suitability of the feeds to the animal.
6. Palatability of the ration.
7. Cost of the ration.

Amount of Dry Matter.

The amount of dry matter in the ration serves to regulate the relative amounts of roughage and concentrates. By roughage are meant the coarser feeds, such as hay, corn fodder, silage; by concentrates are meant the grains, and the other feeds in the ration that are low in their percentage of fibre and water, and high in their percentage of total digestible nutrients. Ordinarily, in rations for cattle and sheep, if two-thirds of the dry matter is from feeds classed as roughage, and one-third from concentrates, the rations will be bulky enough to distend the digestive organs, so as to give the best results. For horses and swine, more dry matter should be in the grains.

Digestibility of the Ration.

A little more than two-thirds of the dry matter in the ration should be digestible, that is, the amount of total digestible nutrients should be at least two-thirds as much as the dry matter. This relation will change with the purpose of the ration, and with the character of the feed. Any ration for productive purposes, however, which shows that the amount of total digestible nutrients is less than two-thirds as much as the amount of dry matter can be improved.

The Nutritive Ratio.

It will be noticed that the rations for growing animals and for milk production are 1:7 or narrower, while the rations for fattening and for labour may be somewhat wider. In none of the rations except in the case of the youngest animals does the nutritive ratio go below 1:4.5. Formerly, it was thought that feeders must calculate the nutritive ratio of "balance" the ration with much exactness. This is no longer considered to be necessary, due to further knowledge in respect to the functions of the nutrients and to the fact that the nutrient protein is not so expensive as in former years. If the nutritive ration given for the purpose is considered to be the widest ration for the best results, and if no ration is made narrower than 1:4.5 except in the case of the youngest animals (which are growing new tissue very rapidly) the ration will be satisfactory.

Variety in the Ration.

All feeders of animals should provide variety in the ration. Variety stimulates the animal's appetite. Better results are obtained from a ration containing several feeds than from a ration limited in variety. A ration for any animal should have two different feeds in the roughage and three or more feeds in the concentrated part of the ration. These feeds should come from not less than three different plants.

Suitability of Feeds to the Animal.

The feeds in the ration should be suited to the animal and to the purpose for which the animal is fed. For example, wheat bran is not suitable for feeding hogs because of its bulk; wheat middlings are much to be preferred.

Palatability of the Ration.

The ration should be palatable if the best results in production are to be obtained. With dairy cows palatability is easily obtained by providing succulent feeds in the ration. The condition of the feed has much to do with its palatability. No musty nor damaged feed should be given to any animal.

Cost of the Ration.

Without doubt, the cost of the ration is the most important factor to be considered by the farmer. However, the other factors must not be sacrificed for cost in every case. A rough way, efficient in most cases, to choose feeds for the greatest economy in the ration is to calculate the cost of 100 lb. of total digestible nutrients in the different feeds available, then to choose those that will yield total digestible nutrients the cheapest—always taking into consideration the six other factors that have just been explained.

HEAVY COST OF FEEDING.

A. Low yield.

B. Extravagant feeding.

C. Indiscriminate purchase of feeding stuffs.

D. Bad management.

A. Calculations show that the more eggs a hen lays the cheaper becomes the cost per egg. Because a 300-egg hen does not require twice as much food, &c., as the 150-egg hen. The most economically managed animals are those that yield well on a normal ration, a matter mainly of *breeding* and *selection*.

Extravagant Feeding.

B. Cases have come under observation, during various investigations where animals of the same number—producing different quantities—but of the same breed and average weight have been fed the same daily allowance. One lot were apparently overfed, while on the other hand, the other lot may have been underfed. Oftimes overfeeding is the case frequently in the feeding of an excessive amount of green-stuff, or commonly named roughages, but more often in the excessive feeding of the foods. The practice of rationing individual animals according to their yield is year by year being more generally adopted.

Indiscriminate Purchase.

C. A farmer when buying should—*first*, know what he wants to buy; *second*, know comparative values. For instance, a food or blending of foods with a protein content of 20 per cent.—providing he is in the market for protein—at £18 per ton is cheaper than one with a protein content of 10 per cent. at £15 per ton. The same rule holds good in the purchase of food for other valuations, such as fat, fibre, &c.

Bad Management.

D. Being a feed expert it would be the height of folly to even offer suggestions as to the general management of your business, that's for others more proficient in the industry to do. Questions relating to feeds and feeding are therefore handled under the foregoing B. and C.

The principle reason for the low yield average in production throughout the world is the lack of knowledge as to the proper feeding of the animal to be fed. There are other reasons also, which may be stated—

1. Lack of ability on the part of the animal to convert food into profitable production.
2. Lack of the proper temperament, constitution, and capacity.
3. Lack of proper amounts of wholesome food.
4. Lack of proper kinds of food.
5. Lack of care and attention.
6. Lack of judgment on the part of the feeder, such as irregularity.
7. Lack of sufficient quantity of *pure* water.

PRODUCTION DEPENDENT ON FEEDING AS WELL AS INTELLIGENT BREEDING AND SKILFUL SELECTION. AVOID HAPHAZARD FEEDING. COMPOSITION OF THE ANIMAL BODY.

The animal body is made up of water and dry matter (ash or mineral matter, protein, carbohydrates, and fats) which comes from the food.

Water.

The animal body when it comes to the point of quantity is largely made up of water. From 40 to 85 per cent. of its gross weight, varying accordingly to its age and condition, consists of water. The water in the animal body serves four purposes: (1) It is a part of all bone and flesh; (2) it serves as a carrier of food from the digestive tract to body cells, wherever they may be located, or from those parts of the body where the food is put into suitable shape to be used by the cells; (3) water removes the wastes of the body through the perspiration and the urine; and (4) it equalises the temperature of the body.

Ash.

Ash or mineral matter is largely found in the bones or skeleton of the body, while other portions of the body may carry small quantities. From 2 to 5 per cent. of the gross weight of the frame is ash. The ash of the animal body consists largely of phosphate of lime. Since ash exists in plentiful quantities in most rations, it need not be considered in a ration, except for young stock or cows producing large quantities of milk.

Protein.

The protein is a very important constituent in the animal body, and contains from 12 to 19 per cent. nitrogen. The flesh, skin, bones (in part), casein and albumin of milk, vital organs, brains, nerves—in fact, the bodily mechanisms—are made up of proteins diluted, so to speak, with water, supported by the ash of the skeleton and rounded out with fat and with water. Protein is a compound made up largely of four elements, carbon, oxygen, hydrogen, and nitrogen.

Carbohydrates.

The carbohydrates of the body are made up of carbon, hydrogen, and oxygen. Very few carbohydrate substances exist in the body, except in the blood. These substances are taken from the blood to furnish the energy of the muscles and part of the heat of the body. The liver acts as a storehouse for carbohydrate and regulates the supply to the blood so that the amount of carbohydrates in the blood is kept uniform for properly supplying the muscles. It is also thought that the liver has the power to make carbohydrates from fats and the protein of the food, if the supply of carbohydrates is limited.

Fats.

These are distributed throughout the body and comprise from 6 to 30 per cent. of the live weight of animals. They consist of carbon, hydrogen, and oxygen, but contain no nitrogen. They consist of the above, and are used to supply energy to the cow and also furnish heat. The fats in the body of the cow are used as a storehouse for heat and energy. They are added to when the food supply is in excess of that needed by the animal for work or production, and they are drawn from when the food supply is short.

COMPOSITION OF FEEDS.

The composition of vegetable matter is made up in a way of substances similar to that of animal matter. Vegetable matter consists of water and dry matter (ash, protein, fat, and carbohydrates, which includes crude fibre and nitrogen free-extract). The dry matter or compounds in vegetable matter varies in proportion and somewhat in composition. In most cases these compounds are not in proper proportions for the best results, so it is necessary for the farmer to mix a number of these feeds to supply the animal with the desired nutrients. From the farmer's standpoint, only three of these food compounds need be considered, because the ash or mineral matter usually is present in sufficient amounts. These three compounds (called nutrients) are protein, carbohydrates, and fat.

Protein in Feeds.

The protein of vegetable matter is a compound composed mostly of carbon, hydrogen, oxygen, and nitrogen. This compound is used to keep up the protein of the body, such as replacing worn out tissues, building new tissues, for growth of hair, hoofs, horns, and for supplying the milk with casein and albumin. Protein cannot be produced in the animal body from carbohydrates and fats of foods.

If there is an excess of protein fed in the ration, it will be used in the production of heat and energy, thus serving the purpose of carbohydrates and fats. Feeds rich in protein are usually higher in price, and while it is always necessary to have a sufficient amount of protein in the ration, the heat and energy demands of the animal body can be more economically met by feeding carbohydrates and fats.

The amount of digestible protein in feed varies from less than 1 per cent. to more than 40 per cent.

Carbohydrates in Feeds.

Carbohydrate is a nutrient which differs from protein in that it does not contain nitrogen, but is made up largely of carbon, hydrogen, and oxygen. It is abundant in our common grasses, in the form of starch, sugar, fibre, &c., and is used by the animal to supply energy, heat, and fat in the body, and, in addition, used by the cow to supply sugar and fat in the milk. It is the cheapest nutrient in our feeds, because it is most abundant; also, it is used in larger quantities by the cow than protein or fat.

Fats in Feeds.

These compounds are made up of nearly the same elements as carbohydrates, and are used by the animal in about the same way. Fats differ from carbohydrates in that they have a heat energy value equal to about two and one-fourth times the energy of the same weight of carbohydrates.

SUMMARY.

The Importance of a Balanced Ration.

1. To support life; to maintain body temperature; to repair and replace body tissues; for the muscular activity of the vital processes.
2. The produce fat, flesh, or milk (production).
3. To perform labour (transform feed into milk).
4. To develop the fœtus.

Nutrients Needed.

1. Varies in different kinds of stock.
2. See nutritive ratios.

Calculating Rations.

1. Palatability.
2. Digestibility.
3. Bulk.
4. Variety.
5. Succulent.
6. Economical.
7. Nutritive ratio.
8. Plenty of protein.
9. Plenty of mineral matter.
10. Suitability.

Water.

Low water content means low production.

Event and Comment.

Cotton Pests—Occurrence on the Downs.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) recently made available a memorandum by the Government Entomologist and Vegetable Pathologist (Mr. H. Tryon) on the failure in growth of young cotton plants in the Darling Downs district. Mr. Tryon stated, respecting the reported Westbrook occurrence, that from the information available he was unable to arrive at the cause of the young plants being cut off just as they were coming through the ground, or being ring-barked if suffered to exist till of somewhat larger growth (P. Felt); for, although certain definite depredators were said to have been formerly implicated, this referred to a time some ten days prior to the visit of Mr. C. J. McKeon, Assistant Instructor in Agriculture, when the cotton no longer existed, and when specimens of the insect, spoken of as "wire worms," were undiscoverable by him. Concerning the cotton field on the farm of Mr. H. Dippel, at Middle Ridge, the foregoing statement, with but little variation, applied to this occurrence also. With regard to the cotton field on the farm of Mr. D. Dippel, in this case Mr. C. J. McKeon found that the young plants to the extent of about 90 per cent. still survived. These (specimens of which were submitted) showed two forms of injury, associated in some instances. In the first place, a small injury in the main stem just below where level with the soil-surface, evidently wrought by some mandibulate insect; and, in the second, a browning and shrinkage of the stem just above and below the soil surface. It could not be affirmed what insect or insects perpetrated the structural injury remarked, for although Mr. McKeon was successful in finding two beetle larvae in the soil after diligent search these insects were only wire worms in appearance—not in reality—nor did they correspond to any known soil-frequenting harmful insect—species apparently inflicted here in some instances by the grub of a small beetle, Gonocephalum. The other destructive change remarked was not of parasitic fungus origin. It conformed, however, to what one would expect to find in young cotton that had experienced conditions favourable to its growth, and then high soil-temperatures; especially operative harmfully when the cultivation had been shallow and the surface allowed to cake. Mr. McKeon had been invited to inquire to what extent, if any, these meteorological factors prejudicially affect young cotton growth.

In the case of the occurrence at Wellcamp, on the farm of Mr. J. E. Horrocks, certain young cotton plants that had survived exhibited aphis and symptoms of aphis attack, as shown by samples brought under his (Mr. Tryon's) notice; others manifested the collar-injury above referred to. Mr. McKeon again, in the case of this crop, elicited a history of insect attack to the underground portion of the plant, but nevertheless could find no individuals still persisting in the soil. Aphides would readily kill young cotton plants, especially if numerous, when not kept down by spraying with an appropriate wash, and the more so should hot soil conditions prevail.

It was very unsatisfactory to have so few data to go upon in arriving at the primary cause of the trouble in these instances mentioned. That this was the case was partly owing to the late hour in which the fact of the destruction of the seedling cotton in the instances mentioned had been brought to the Department's notice. There were some grounds for concluding, apart from what might be inferred from the data adduced, that much of the young cotton in these instances of failure had succumbed to meteorological factors acting through the medium of the soil.

The Study of Agriculture.

"Queensland needed the study of the science of agriculture more than any other activity," said the Premier (Hon. E. G. Theodore) in the course of a recent address to the students of Nudgee College. Continuing his remarks, the Premier asserted that Queensland must inevitably become a great agricultural State; it had all the resources to make it a wonderful country. The educational system should, therefore, impress upon the minds of Queensland youth the immensity of the wealth lying latent in her fertile soil. "If I can do anything," added the Premier, "as head of the Government, in interesting my colleague, the Minister for Education, in the development of the idea of such an aim in education, I shall do it with all my heart."

Overcrowded Professions and an Undermanned Industry.

"There had been too much inclination on the part of parents in the past," continued the Premier, "to draft their boys into the polite professions, such as medicine and law. The parents of to-day ought to realise that, as compared with other professions, there was just as much work called for, just as much intelligence required, just as great a force of character needed, just as many of those manly attributes which made for purpose in life, moulded in the study of the science of agriculture and the development of the resources of the soil. Queensland was destined, in the not very distant future, to carry a large population, which would

be earning a livelihood from tilling the soil. It would be only a little time when the farmer would occupy an immeasurably higher position. A man who was a farmer in England did not rate himself socially any lower than a man who was, say, a clerk in the Government service. Neither should it be in Queensland. In the future, there would be no undermining of the dignity of the man who made his livelihood from the land. Quite as much was required to train a man for the tilling of the soil as for any other occupation in life. Knowledge in the first degree was required of the chemistry of the soil and entomology. Knowledge was also required of such scientific things which would make the soil produce the best and add to the prosperity of the State. Our educational system must be so moulded that our farmers would be scientific farmers, and not merely potterers upon the land."

A Field of Opportunity.

"The Government had recently had experience of the want of scientific men," the Premier added. "An expert was required to teach settlers how to grow cotton, and it had to go to America for a man at an expensive salary. A director of agriculture had had to be engaged from India, and an appeal had had to be made down South for a man to train our own men in certain directions. That should not be. The native Queenslander had as much ability and capacity to learn, and was quite as intellectual as the youth of any other country. The boys of to-day, and particularly those in colleges, had wonderfully improved opportunities for learning, as compared with fathers or their ancestors of some years ago. The system of education had made wonderful strides during the last twenty years, and even during the last ten years. Many boys now had the advantage of the secondary course, which they would not have had the remotest chance of getting twenty years ago. The boys should appreciate that, and, when the time came for them to choose a career, they should remember that this State was developing, and would become great. They should endeavour to visualise the future of what Queensland would be, and should not take a course of study which might lead them to professions already overcrowded. Any boy who had ambition and desired achievement, would have great possibilities in the vast extent of Queensland's resources. The policy of every Government would include advancement in education and science. The fact that there were hundreds of thousands of square miles in this State ought to instil in youth a great inspiration to go ahead and make the country a rich nation."

Ratoon Cotton.

Mr. B. Crompton Wood, chairman of the British Cotton Delegation, made the following statement on leaving South Australia:—

"A good deal has been written lately in the Press about growing cotton on the ratoon principle—that is, leaving the plant in the ground from year to year, instead of sowing annually. In face of the importance to the industry of this question, I should like to state some of the reasons that have lead us to condemn this system.

"All authorities who have ever had anything to do with manufacturing cotton agree that the fibre of cotton grown under ratoon methods deteriorates year by year, both in the strength and the regularity of the staple, the former resulting in weak yarn, the latter in greater waste in the process of spinning. Hence, ratoon cotton is not admitted in the Cotton Exchanges of the world as good, sound cotton. In addition to this, there can be no question that the system of ratooning increases the insect pests, which are so destructive to cotton, by affording a natural harbourage for them from year to year.

"So serious is this considered in Egypt that legislation has been passed enforcing the destruction of all cotton shrubs by fire at the end of each season. A similar law is not necessary in the United States where most cotton-growing areas are subject to heavy frosts, which, by killing the plant, prevent any question of ratooning, but in the few areas where frost does not occur, ratoon cotton is not grown, and the Department of Agriculture strongly condemn this method of culture.

"It must, therefore, be obvious that cotton grown under the ratoon system does not conduce to the production of the highest qualities of cotton, and so tends to imperil the success of the industry.

"In addition, as cotton growers in Australia are very favoured by the high price guaranteed to them by their Governments, the least they can do is to grow as good cotton as possible, so as to reduce the loss which almost certainly must be incurred by the community at large under these guarantees.

"Finally, to solve this question, tests are being made by the Australian Cotton Growing Association, who, subject to Government approval, are growing cotton from the same seed and in the same place, under both systems, so as to obtain exact data. I sincerely hope that until these experiments have proved otherwise, the practice, general in the world, of growing cotton annually shall be adopted in Australia.

"It must never be forgotten that in countries with cheap labour and low freights to the cotton spinning centres, it may pay to grow a third-rate quality of cotton, but this cannot apply to Australia."

Production, Prospects, and Prices.

The information set out hereunder has been abstracted from departmental summaries of market movements and weather conditions for the month of November. The value of a monthly journal as a vehicle for market information is obviously limited, and this review is merely a record of the month's conditions and marketings.

Weather and Crops.

The first week of November was hot and dry. In some of the maize areas, particularly the Lockyer, early sown crops were wilting. In the course of the week ended 11th November light showers were registered, fairly generally in the south-east corner. Light scattered showers were reported from other parts of the coast. beneficial falls were reported from various Downs centres, though generally dry weather was favouring harvesting operations. Above the Range maize planting was being deferred for a further splash of the needful.

In the course of the second week of the term light showers were experienced in areas adjacent to the metropolis. Cotton planting was, however, being delayed for heavier precipitation. Country reports showed that an exceptionally dry spring had been experienced; as a result markets were improving in tone.

Widely distributed rains were reported in the third week of the term. These were, however, of a light nature, and their chief benefits were as pasture refreshers. Theebine had the highest registration with 183 points. Gympie was favoured to the extent of 145 points. Other places with over an inch registration were Nanango, Gundiah, Emu Vale, Stanthorpe, and Laidley. Good soaking rain was required to start the main new season's cotton planting and bring along the young plants already above ground.

Further useful showers were reported in the following week from the South Coastal, Carpentaria, and Central districts; thunderstorms were reported from some parts of the West. A good general fall was still an outstanding need. Temperatures were high.

The Markets.

Product.	Week ended 4th November.	Week ended 11th November.	Week ended 18th November.	Week ended 25th November.
Lucerne chaff..	6s. 9d. to 12s. 10d.	Prime to 11s. 6d.; Other grades, to 9s.	Prime, 8s. 4d. to 11s. 4d.	Prime to 10s.; Inferior, 5s. 3d. to 7s.
Oaten chaff ..	Border, 7s. 6d. to 9s. 9d.; Local, 4s. 6d. to 8s. 3d.	8s. to 10s. 3d. ..	Border, 8s. to 10s.; Local to 8s. 3d.	Border to 11s.; Local to 10s.
Mixed chaff ..	7s. 4d. to 9s. 7d.	7s. to 10s. 4d. ..	4s. 3d. to 10s. ..	9s.
Maize	5s. 2½d. to 5s. 4½d.	5s. 2½d. to 5s. 3½d.	5s. 5d. to 6s. 1½d.	6s. 2d.
Potatoes ..	11s. to 18s. 2d.	7s. 6d. to 16s. ..	10s. to 20s. 6d.	11s. to 18s. 6d.
Sweet potatoes	6s. to 7s. 6d. ..	7s. to 8s. ..	7s. 9d.	Market bare
Pumpkins ..	4s. 6d. to 8s. 3d.	11s. 6d... ..	6s. 6d. to 14s. ..	13s. 6d.
Wheat (feed) ..	5s. 7½d. to 6s. 5d.	6s. 4½d. to 6s. 6d.	5s. 6d. to 6s. 4d.	6s. 3d.
Barley	None offering ..	Bare	5s. (skinless) ..	4s. 4d. to 4s. 5d,
Broom millet ..	£40 to £50 ..	Unchanged ..	Unchanged ..	Unchanged

General Notes.

An Effective Rat Poison.

In an article in the current number of the "Quarterly Review" on "Education for Farmers," the statement is made that the rat population on the farms in England eat more food than would pay for all the agricultural education of the country, and on a scale undreamt of at present. The writer points out that a mixture of carbonate of barium and red squills, placed in a suitable medium, is death to rats, but will not harm a chicken. Poultry-keepers should make a note of the mixture and use it to exterminate the rats. Most chemists sell the mixture ready for use.

Red squills are only successful when obtainable in a fresh state, which is said to be not possible in Australia. Carbonate of barium is an effective poison used as follows:—Carbonate of barium, 8 oz.; oatmeal, 16 oz.; beef dripping or tallow, 8 oz.; salt, ½ oz. Knead this mixture into a dough, cut into ½-inch cubes, and place near rat holes. This mixture is not considered dangerous to domestic animals or human life.

Arrowroot Pool Board.

The ballot taken by arrowroot growers for the purpose of selecting a board to control the Arrowroot Pool formed recently resulted as follows:—Messrs. Alex. Clark, Thos. Doherty, Alex. McG. Henderson, Johannes Lahrs, and J. F. W. Sultmann.

Wheat Pool Board.

The Wheat Board election results are as follows:—Messrs. F. J. Morgan, Robt. Swan, J. T. Chamberlin, B. C. C. Kirkegaard, A. J. Harvey, and Thos. Muir.

Meat Industry Advisory Board.

The gentlemen listed as follows have been elected to the Meat Industry Advisory Board:—Messrs. E. T. Bell, M.L.A., J. L. Wilson, R. C. Philp, T. Snelling, R. H. Edkins, W. P. Shaw, A. S. Drewe, W. H. Austin, R. Grant, and C. H. Sagar.

Development of Cotton Growing—Appointment of Director of Cotton Culture

A recent cablegram announced that Colonel G. Evans, lately Director of Agriculture in Bengal, has been selected by the Empire Cotton Growing Corporation, at the instance of the Queensland Government, to advise on the development of cotton growing in this State. In the course of a Press interview, the Premier (Hon. E. G. Theodore) said that Colonel Evans had been selected for the Queensland Government, and would occupy the position of director of cotton culture. He would be accompanied by a staff of assistants, also selected by the Corporation or by Colonel Evans. The Director of Cotton Culture and his staff would be appointed to their respective positions by the Queensland Government, but for the first two years their salaries would be paid by the Empire Cotton Growing Corporation, which, it would be remembered, had received a subsidy of £1,000,000 from the British Government for the purpose of encouraging the production of cotton within the Empire. At the expiration of the term of two years, the Queensland Government would make direct arrangements with Colonel Evans.

Answers to Correspondents.

Trees Suitable for Planting in the Bell District.

C. F. (Bell)—

The Government Botanist (Mr. C. T. White, F.L.S.) advises:—

Tamarind trees are not likely to do well, or, in fact, even to grow at Bell; this tree wants a rather moist tropical or sub-tropical climate.

Coral Trees of certain species (e.g., *Erythrina caffra*) might be worthy of trial. The flowering Gums (*Eucalyptus ficifolia* and *Eucalyptus calophylla*) do not as a general rule thrive well in Queensland, and it is better to only plant a few trees as a trial than a large number, though they are likely to succeed better at Bell than on the coast.

The trees listed as follows are likely to succeed, and should be all obtainable from Brisbane or Toowoomba nurserymen:—

Pittosporum undulatum (*Pittosporum*).
Sterculia diversifolia (Kurrajong).
Sterculia rupestris (Bottle tree).
Sterculia trichosiphon (Broad-leaved bottle tree).
Schinus molle (Pepper or pepperina tree).
Schinus terebinthifolius (Broad-leaved pepper tree).
Acacia podalyriæfolia (Queensland silver wattle).
Bauhinia Hookeri (Native Bauhinia tree).
Albizzia lebbek (Albizzia or "acacia tree").
Melia composita (White cedar).
Eucalyptus spp. (Gum trees).
Celtis australis (Portugese elm).
Grevillea robusta (Silky oak).
Platanus occidentalis (Plane tree).
Pinus spp. (Pines).

The Use of Lime in the Stanthorpe District.

M. E. S. (Applethorpe), writes:—

Enclosed please find two Press cuttings* which have recently appeared in our local paper. At present the Fruitgrowers' District Council are taking steps with a view to obtaining large quantities of lime at cheaper rates, but after reading these articles, many growers are beginning to doubt the wisdom of such steps.

Will you kindly advise us on this matter. If you still advocate lime, kindly state—

(1) Whether burnt or pulverised?

(2) What quantities to be used, annually or otherwise?

(3) Most suitable time to apply same?

(4) Would it benefit where no green crop is grown?

Green crops suitable to grow here in winter are barley and peas (grey or dun), and meliotus clover.

Thanking you in anticipation.

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*(1) Report of lecture upon the "Use of Lime on Soil," by Mr. H. Wenholz, N.S.W. Dept. of Agric., before the Agricultural Section of the Royal Society, Sydney.

(2) Letter by Mr. James Henderson, Stanthorpe, to "The Border Post."

On the letter and the Press cuttings the Agricultural Chemist (Mr. J. C. Brünnich) comments as follows:—

"The remarks made by Mr. Henderson contain a good deal of truth, and of course any application of some 6 tons of lime would be madness. With regard to the lecture delivered by Mr. Wenholz, of which an extract appeared in the 'Border Post,' it must be pointed out that the lecture does not apply to our fruitgrowing areas, but rather to general agriculture. The remarks made by Dr. Hall on the necessity of liming are perfectly correct, but apply to the intense cultivation practised in Europe.

"In order to study the lime requirements of our Stanthorpe granitic soils, the whole composition of the soil must be taken into consideration, and we find that although the actual amounts of plant foods are low, as compared with those found in our rich agricultural lands, they are well balanced and supported by an excellent physical condition of the soil, which encourages an exceptionally fine root development, and makes therefore the small amounts go much further.

"The average of 11 types of soil analysed was found to contain per acre to 12 inches depth—

Lime: ..	Total 4,270 lb.	Readily available	1,437 lb.
Phosphoric Acid:	Total 2,546 lb.	Readily available	197 lb.
Potash: ..	Total 2,423 lb.	Readily available	287 lb.
Nitrogen: ..	Total 1,355 lb.	——	

adding lime to soils of this composition would be of little or no benefit to fruit trees, but quickly growing crops, like green manure crops, vegetables, &c., would undoubtedly be benefited, more particularly if other fertilisers, particularly those containing nitrogen and phoric acid, would be applied at the same time.

"Farmers often make the mistake in thinking and expecting that an application of lime alone will cure all evils and will replace the use of other fertilisers or even of thorough cultivation.

"The theoretical opinion so frequently expressed to use quick lime for heavy clayey soils, and to use pulverised limestone for light sandy soils, is quite correct, but should not be taken literally when applied to the light dressings of lime now made every 2 or 3 years, on account of the high cost of lime.

"When half a ton of quick lime is applied broadcast to an acre of ground after being air slaked, in a very short time the bulk of it will have changed into carbonate of lime, but still the action on the soil would be very quick by the slight amount of lime immediately dissolved by rain and dew, whereas when applying the equivalent amount of lime in form of one ton of pulverised limestone the action would be very slow, and perhaps not noticeable the first season.

"Therefore use lime in its cheapest form, which is burnt lime, apply at the rate of half a ton per acre, every 2 or 3 years, before the planting of green manures, and do not neglect the use of artificial fertilisers, and farmyard manure, and compost if available."

"Fish Poison Vine" *(Derris Uliginosa).*

J. C. (Mibu Estate, Daru, Papua) writes:—

By this post I am sending you, under separate cover, the leaves, stem, and root of a vine, the roots are used by the natives here to stupefy fish with, and as we planters buy a lot of this fish to eat, we should be much obliged if you could tell us the poison it contains, and if it could be purchased and used for the same purpose.

The root in the package is the part that has a piece of the vine twisted round it, the natives only use the root, and beat it up to a pulp, and then squeeze it into still pools, presently the fish come up belly up, and are easily caught. The native name for the vine is "Sardie." I can't procure a flower or berry. They are propagated by slips. Thanking you in advance.

The Government Botanist (Mr. C. T. White, F.L.S.) comments as follows:—

"It bears no flowers or pods, but is evidently *Perris uliginosa*, a plant used considerably in New Guinea, Asia, North Australia, and the Pacific Islands as a fish poison. In New Guinea it goes under the name of "Dynamite Plant" from this fact.

"The poisonous principle is a resin isolated by the late Dr. Greshoff, a famous plant chemist, at one time Director of the Botanic Gardens, Buitenzorg, Java. The isolated resin cannot, I believe, be purchased, but the root of an allied species, *Derris elliptica*, is an article of export from Singapore, where it is known as Tuba roots.

"Derris roots and stems are a commercial product, and during the last few years have been largely used as the basis for many commercial insecticides. I have before mentioned the fact that the collecting of 'Sardie' stems and roots should be made a rather profitable native industry. What do you think of the probabilities of this?"

Dividing Fences.

R. P. H. (Yangan)—

(1) If you are in doubt about the line, you should employ a surveyor to determine the actual boundary, and if you decide to do so, you should give due notice to your neighbour of same.

(2) and (3) A dividing fence is sufficient if it keeps cattle back.

(4) If your neighbour's cattle trespass on your land, they can be impounded if the land is fenced, and there is no need to wait three months. If it is unfenced, you had better consult your solicitor before taking any action.

(5) Being unaware of local circumstances, you are advised to consult your solicitor.

The Cultivation of Newly Cleared Land.

S. Bale (Petrie)—

The Director of Agriculture, Mr. H. C. Quodling, replies to your queries as follows:—

"Land which has been previously covered with dense undergrowth requires different treatment to that where the timber has been ringbarked as in your case. Owing to the fact of the ringbarking, the soil is to a certain extent sweetened, and following on the removal of the timber is available for almost immediate cultivation. Virgin land, however, is always improved by being turned with the plough and exposed to atmospheric influences to sweeten it. No crops should be planted within the area covered by the limbs of any green tree, and if possible this radius should be increased to at least 50 per cent.

"Among crops which do well on new land may be mentioned potatoes, oats, and rape, but even with these a certain amount of variation is necessary.

"Liquid manure is usually utilised for the purpose of stimulating plants which require rapid growth, but should not be used too strong. For your purpose it is considered that half a three-bushel bag of well-rotted farm manure should be steeped in a cask of not less than 20 gallons of water. This should be used in the proportion of one gallon to six, and should never be applied to plants, under dry conditions, but should follow the application of pure water. Certain timbers contain a higher percentage of potash than others, but as a general rule wood ashes are all more or less of value as a fertiliser, as will be noticed where old stumps have been burnt out.

"You mention that your country is covered with lantana, red oak, silver wattle, &c. Where lantana is growing the land is improved somewhat by the root system of the lantana, also by the amount of leafy matter (humus) it returns to the soil.

"Farm yard manure is improved somewhat by mixture with wood ashes. The mixture should be applied immediately to the land. Owing, however, to the inclusion of slight quantities of carbonate of lime in ashes, these, when used on exposed farm yard manure, are likely to liberate a small portion of the ammonia contained therein.

"This Department issues a publication entitled 'Market Gardening,' which will be forwarded to you on receipt of 1s. This publication contains an amount of information which will be valuable to a new settler."

Disease among Fowls.

F. S. (Curra L.P.A.) writes:—

(1) Can you tell me the cause of fowls—laying hens—dropping dead from their roosts during the night. The fowls are weighty and healthy, and well fed on wheat and peas. We can find no trace of any animal causing the damage, neither, when we open the fowls, can we see the cause of death?

(2) About ten years ago the Agricultural Chemist compiled a table of "The Manurial Requirements of Plants per Acre," which was published in the "Journal." I had it pasted on cardboard, but I now find the vermin have eaten it away. Can you publish the same table again? It is exceedingly useful to fruitgrowers.

The Poultry Instructor (Mr. J. Beard) comments:—

(1) It is very difficult for me to diagnose the trouble the fowls are suffering from owing to the limited explanation given. The correspondent omits to explain the nature, substance, and colour of the excreta, which is my best guide. If the excreta is of a bilious nature, the fowls are suffering from enteritis.

Quarantine affected birds, clean thoroughly and disinfect the house and run. Give each affected bird two teaspoonfuls of castor oil. Two hours after give 10 drops of chlorodyne in bread in the form of a pill; should the excreta not harden in from six to eight hours, give another five drops. Give scalded milk to drink.

(2) Yes.

To Correspondents.

Correspondents seeking information through the Journal should address all communications to the Under Secretary, Department of Agriculture and Stock, Brisbane. Letters on official matters should not be addressed personally to the Editor, who may be away from Headquarters on official duty at the time of their delivery; so to ensure prompt acknowledgment all technical inquiries should be directed, as suggested, to the Under Secretary.

Farm and Garden Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole. Early-sown cotton will be in bloom.

As the wet season is expected to commence this month, provision should be made accordingly.

On coastal and intercoastal scrub districts, where recently burnt-off scrub lands are ready for the reception of seed of summer-growing grasses, sowing may commence as soon as suitable weather is experienced. Much disappointment may be saved, and subsequent expenditure obviated, by ensuring that only good germinable grass seed is sown, of kinds and in quantities to suit local conditions, the circumstance being kept in mind that a good stand of grass is the principal factor in keeping down weeds and undergrowth.

In all districts where wheat, barley, oats, canary seed, and similar crops have recently been harvested, the practice of breaking up the surface soil on the cropped areas should invariably be adopted. Soil put into fit condition in this way will "trap" moisture and admit of the rains percolating into the subsoil, where the moisture necessary for the production of a succeeding crop can be held, provided attention is given to the maintenance of a surface mulch, and to the removal, by regular cultivation, of volunteer growths of all kinds. If not already seen to, all harvesting machinery should be put under cover, overhauled, and the woodwork painted where required.

Where maize and all summer-growing "hoed" crops are not too far advanced for the purpose, they should be kept in a well-cultivated condition with the horse hoe. Young maize and sorghum crops will derive much benefit by harrowing them, in the same direction as the rows are running, using light lever harrows with the tynes set back at an angle to obviate dragging out of plants, but the work should not be done in the heat of the day.

Quick-maturing varieties of maize and sorghum may still be sown in the early part of the month in coastal areas where early frosts are not expected.

Succession sowings may be made of a number of quick-growing summer fodder crops—Sudan grass, Japanese and French millet, white panicum, and liberty millet (panicum). In favourable situations, both "grain" and "saccharine" sorghums may still be sown; also maize, for fodder purposes.

Fodder conservation should be the aim of everyone who derives a living from stock, particularly the dairyman; the present is an important period to plan cropping arrangements. Exclusive of the main crops for feeding-off (when fodder is suitable for this purpose), ample provision should be made for ensilage crops to be conserved in silo or stack. As natural and summer-growing artificial grasses may be expected to lose some of their succulence in autumn, and more of it in winter and early spring, the cropping "lay-out" to provide a continuity of succulent green fodder throughout the season calls for thorough and deep cultivation and the building up of the fertility and moisture-holding capacity of the soil. Planter's friend (sorghum) may be sown as a broadcast crop at the latter end of the month for cutting and feeding to cattle in the autumn and early winter. Strips of land should be prepared also for a succession sowing about the second week in February, and for winter-growing fodder crops.

KITCHEN GARDEN.—A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering.

Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflower, mustard, cabbage, celery, radish for autumn and winter use. Sow celery in shallow well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

FLOWER GARDEN.—To make the flower-beds gay and attractive during the autumn and winter months is not a matter of great difficulty. Prepare a few shallow boxes, boxes with the compost; then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle lift them gently one by one with a knife or a zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Keep a sharp lookout for slugs and caterpillars.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over-water at this season. Propagate verbenas, not forgetting to include the large scarlet Foxhunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed-boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight.

Orchard Notes for January.

THE COASTAL DISTRICTS.

All orchards, plantations, and vineyards should be kept well cultivated and free from weed growth; in the first place, to conserve the moisture in the soil, so necessary for the proper development of all fruit trees and vines; and, secondly, to have any weed growth well in hand before the wet season commences. This advice is especially applicable to citrus orchards, which frequently suffer from lack of moisture at this period of the year if the weather is at all dry, and the young crop of fruit on the trees is injured to a greater or less extent in consequence.

Pineapple plantations must also be kept well worked and free from weeds, as when the harvesting of the main summer crop takes place later on, there is little time to devote to cultivation. If this important work has been neglected, not only does the actual crop of fruit on the plants suffer, but the plants themselves receive a setback.

Banana plantations should be kept well worked, and where the soil is likely to wash badly, or there is a deficiency of humus, a green crop for manuring may be planted. Should the normal wet season set in, it will then soon cover the ground without injury to the banana plants. When necessary, banana plantations should be

manured now, using a complete manure rich in potash and nitrogen. Pineapples may also be manured, using a composition rich in potash and nitrogen, but containing no acid phosphate (superphosphate) and only a small percentage of bone meal, ground phosphatic rock, or other material containing phosphoric acid in a slowly available form.

Bananas and pineapples may still be planted, though it is somewhat late for the former in the more Southern parts of the State. Keep a good lookout for pests of all kinds, such as Maori on citrus trees, scale insects of all kinds, all leaf-eating insects, borers, and fungus pests generally, using the remedies recommended in Departmental publications.

Fruit-fly should receive special attention, and on no account should infested fruit of any kind be allowed to lie about on the ground to become the means of breeding this serious pest. If this is neglected, when the main mango crop in the South and the early ripening citrus fruits are ready, there will be an army of flies waiting to destroy them.

Be very careful in the handling and marketing of all kinds of fruit, as it soon spoils in hot weather, even when given the most careful treatment. Further, as during January there is generally more or less of a glut of fresh fruit, only the best will meet with a ready sale at a satisfactory price.

Grapes are in full season, both in the Brisbane and Coominya districts, and in order that they may be sold to advantage they must be very carefully handled, graded, and packed, as their value depends very much on the condition in which they reach the market and open up for sale. Well-coloured fruit, with the bloom on and without a blemish, always sells well, whereas badly coloured, immature, or bruised fruit is hard to quit.

One of the greatest mistakes in marketing grapes is to send the fruit to market before it is properly ripe, and there is no better way to spoil its sale than to try and force it on the general public when it is sour and unfit to eat.

Bananas for sending to the Southern States require to be cut on the green side, but not when they are so immature as to be only partially filled. The fruit must be well filled but show no sign of ripening; it must be carefully graded and packed and forwarded to its destination with as little delay as possible.

Pineapples should be packed when they are fully developed and the base pips are beginning to show the first trace of colour. Immature fruit must not be sent. For canning, the fruit should be partly coloured; immature fruit is useless; and over-ripe fruit is just as bad. The former is deficient in colour and flavour and the latter is "winey" and of poor texture, so that it will not stand the necessary preparation and cooking.

Should there be a glut of bananas, growers are advised to try and convert any thoroughly ripe fruit into banana figs.

The fruit must be thoroughly ripe, so that it will peel easily, and it should be laid in a single layer on wooden trays and placed in the sun to dry. If the weather is settled, there is little trouble, but if there is any sign of rain the trays must be stacked till the weather is again fine, and the top of the stack protected from the rain. To facilitate drying, the fruit may be cut in half lengthways. It should be dried till a small portion rubbed between the finger and thumb shows no sign of moisture. It can be placed in a suitable box to sweat for a few days, after which it can be dipped in boiling water to destroy any moth or insect eggs that may have been laid on it during the process of drying and sweating. It is then placed in the sun to dry off any moisture, and when quite dry it should be at once packed into tight boxes lined with clean white paper. It must be firmly packed, when, if it has been properly dried, it will keep a considerable time. It can be used in many ways, and forms an excellent substitute for raisins, sultanas, currants, or other dried fruits used in making fruit cakes and other comestibles. Banana figs will be found useful for home consumption, and it is possible that a trade may be built up that will absorb a quantity of fruit that would otherwise go to waste.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Granite Belt, and orchardists are fully occupied gathering, packing, and marketing the crop of midseason fruits, consisting of plums of several kinds, peaches, nectarines, pears, and apples. The majority of these fruits are better keepers and carriers than those that ripen earlier in the season; at the same time, the period of usefulness of any particular fruit is very limited, and it must be marketed and disposed of with as little delay as possible.

The advice given in the Notes for December, to send nothing but first-class fruit to market, still holds good. With the great increase in production, owing to the large area of new orchards coming into bearing and the increasing yields of those orchards that have not come into full profit, there is not likely to be any market for immature or inferior fruit. There will be ample good fruit to fully supply the markets that are available and accessible. Much of the fruit will not carry much beyond the metropolitan market, but firm-fleshed plums, clingstone peaches, and good, firm apples should stand the journey to the Central, and, if they are very carefully selected, handled in a manner to prevent any bruising, and properly graded and packed, they should carry as far as Townsville. Growers must remember that, given a market fully supplied with fruit, only such fruit as reaches that market in first-class condition, is likely to bring a price that will pay them; consequently the grower who takes the trouble to send nothing but perfect fruit, to grade it for size and colour, to pack it carefully and honestly, placing only one sized fruit, of even quality and even colour, in a case, and packing it so that it will carry without bruising, and, when opened up for sale, will show off to the best advantage, is pretty certain of making good. On the other hand, the careless grower who sends inferior, badly graded, or badly packed fruit is very likely to find, when the returns for the sale of his fruit are to hand, that after paying expenses there is little, if anything, left. The expense of marketing the fruit is practically the same in both cases.

Then "why spoil the ship for the ha'p'orth of tar" after you have gone to the expense of pruning, spraying, manuring, and cultivating your orchard? Why not try and get a maximum return for your labour by marketing your fruit properly? The packing of all kinds of fruit is a fairly simple matter, provided you will remember—

(1) That the fruit must be fully developed, but yet quite firm when gathered.

(2) That it must be handled like eggs, as a bruised fruit is a spoilt fruit, and, when packed with sound fruit, spoils them also.

(3) That only one-sized fruit, of an even degree of ripeness and colour, must be packed in a case.

(4) That the fruit must be so packed that it will not shift, for if it is loosely packed it will be so bruised when it reaches its destination that it will be of little value. At the same time, it must not be packed so tightly as to crush the fruit.

If these simple rules are borne in mind, growers will find that much of the blame they frequently attribute to the fruit merchants or middlemen is actually the result of their own lack of care. Fruit that opens up in the pink of condition sells itself, whereas any fruit that opens up indifferently is hard to sell on any except a bare market, and on a glutted market is either unsaleable or realises such a poor price that the grower is frequently out of pocket and would have been better off had he not attempted to market it.

If spraying with arsenate of lead, and systematic bandaging, has been properly carried out, there will be comparatively few codlin moths to destroy the later ripening pip fruits; but if these essential operations have been neglected or carelessly carried out, a number of moths will hatch out and the eggs laid by them will turn to larvæ that will do much damage, in some cases even more than that caused by the first broods that attack the fruit as soon as it is formed. Where there is any likelihood, therefore, of a late crop of moths, spraying with arsenate of lead must be continued if the late crop of pip fruits is to be kept free from this serious pest.

Fruit-fly must be systematically fought, and on no account must any fly-infected fruit be allowed to lie about on the ground and breed this pest, to do further damage to the later ripening fruits.

Citrus orchards will need to be kept well cultivated in the drier and warmer parts of the State, and, where necessary, the trees should be irrigated. If scale insects are present, the trees should be either sprayed, or, better still, treated with hydrocyanic acid gas.

Western grapes are in full season, and if they are to be sent long distances by rail, then they are all the better to be cut some hours before they are packed, as this tends to wilt the stems and keep the berries from falling off in transit. The fruit must be perfectly dry when packed, and should be as cool as possible. It must be firmly packed, as a slack-packed case always carries badly and the fruit opens up in a more or less bruised condition.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5·34	5·50	5·4	6·8	4·50	6·32
2	5·33	5·51	5·3	6·9	4·50	6·33
3	5·32	5·52	5·3	6·9	4·50	6·34
4	5·31	5·52	5·2	6·10	4·50	6·35
5	5·29	5·53	5·1	6·11	4·50	6·36
6	5·28	5·53	5·0	6·12	4·51	6·36
7	5·27	5·54	5·0	6·12	4·51	6·37
8	5·25	5·54	4·59	6·13	4·51	6·38
9	5·24	5·55	4·59	6·14	4·51	6·38
10	5·23	5·55	4·58	5·15	4·51	6·39
11	5·22	5·56	4·57	6·16	4·52	6·39
12	5·21	5·56	4·57	6·16	4·52	6·40
13	5·20	5·57	4·56	6·17	4·52	6·40
14	5·19	5·57	4·56	6·18	4·52	6·41
15	5·18	5·58	4·55	6·19	4·53	6·41
16	5·17	5·59	4·55	6·20	4·53	6·42
17	5·16	5·59	4·54	6·20	4·53	6·43
18	5·15	6·0	4·54	6·21	4·54	6·44
19	5·14	6·0	4·53	6·22	4·54	6·45
20	5·13	6·1	4·53	6·23	4·55	6·45
21	5·12	6·2	4·53	6·24	4·55	6·46
22	5·11	6·2	4·52	6·24	4·56	6·46
23	5·10	6·3	4·52	6·25	4·56	6·46
24	5·9	6·3	4·51	6·26	4·57	6·47
25	5·8	6·4	4·51	6·27	4·57	6·47
26	5·8	6·5	4·51	6·28	4·58	6·47
27	5·7	6·6	4·50	6·28	4·59	6·48
28	5·6	6·6	4·50	6·29	5·0	6·48
29	5·5	6·7	4·50	6·30	5·0	6·49
30	5·5	6·7	4·50	6·31	5·1	6·49
31	5·4	6·8	...	...	5·1	6·49

PHASES OF THE MOON, OCCULTATIONS, &c

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

6 Oct.	○	Full Moon	10 58 a.m.
14 „	☽	Last Quarter	7 55 a.m.
20 „	●	New Moon	11 40 p.m.
27 „	☾	First Quarter	11 26 p.m.

Apogee on 5th at 6 a.m.

Perigee on 20th at 2.42 a.m.

An occulation of Delta Tauri will take place on 10th October about a quarter past 9. With binoculars or a small telescope this will be an interesting sight as the Moon will be in the group of stars called the Hyades of which Aldebaran is the principal star.

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5 Nov.	○	Full Moon	4 36 a.m.
12 „	☽	Last Quarter	5 52 p.m.
19 „	●	New Moon	10 6 a.m.
26 „	☾	First Quarter	6 15 p.m

Perigee on the 17th at 10.6 a.m.

Apogee on the 29th at 5.24 a.m.

Delta Tauri will again be occulted about 3 a.m. on the 7th; also Eta Virginis on the 15th about 9.30 p.m.; and the planet Saturn on the 16th about 5 p.m. when the Moon and it are far below the horizon.

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4 Dec.	○	Full Moon	9 24 p.m.
12 „	☽	Last Quarter	2 41 a.m.
18 „	●	New Moon	10 20 p.m
26 „	☾	First Quarter	3 53 p.m.

Perigee on 15th at 1.30 a.m.

Apogee on 27th at 2.6 a.m.

Delta Tauri will be occulted about 10 a.m. on the 4th, when the Moon and star are below the horizon, but on the 31st, when it will be occulted about the time of sunset, an interesting observation of the star's reappearance may be possible in the twilight.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.