

THE QUEENSLAND JOURNAL OF AGRICULTURAL SCIENCE

VOL. 5. No. 4.

DECEMBER, 1948

PHYLLODY IN THE PAPAWE (*Carica papaya*).

By T. MCKNIGHT, M.Sc., Pathologist, and S. L. EVERIST, B.Sc., Botanist, Science Branch.

During the course of investigations into the virus causing "yellow crinkle" disease of the papaw (*Carica papaya* L.), interesting examples of phyllody have been observed. Though this condition was mentioned by Simmonds (1938), no detailed observations were given. It is considered that a description of the very marked development of phyllody in plants infected with the virus would be of interest to other workers.

In normal female flowers (Plate 1A) the calyx lobes are about the same length as the tube (i.e., 2-3 mm.), narrowly triangular or deltoid in outline, closely adpressed to the petals, and nerveless. The petals are normally cream coloured and imbricate and at the base remain closely clasped around the fruit until the tips begin to wither. They are lanceolate and thickened at the base. The ovary is cream coloured and ovoid. The stigma is usually about 1 cm. long and is a very pale lemon-yellow.

In a plant infected with yellow crinkle the most conspicuous feature is the green colour of all of the flower parts. There is usually some enlargement of the calyx lobes without any corresponding increase in the size of the calyx tube. In extreme cases the calyx lobes are markedly divergent, leaflike, linear to linear-spathulate and up to 6 cm. long, with a prominent white midrib and conspicuous reticulate veins which are often pink to red in colour. The calyx lobes are sometimes undulate on the margins. The petals are also leaflike, spreading, the basal thickening not so marked as in uninfected plants, narrow-lanceolate to linear, sometimes with conspicuous reticulate veins, often pinkish-red in colour.

The ovaries of infected plants vary considerably. In the majority the ovary is pale green to leaf-green, much smaller than normal, with the stigma reduced to a very small white or pale-cream coloured branched structure less than 0.1 cm. long. Often the ovary develops unevenly and is irregularly ovoid in shape with an eccentric style.



Plate 1.

Normal and yellow-crinkle infected flowers. A. Normal female flower. B. Carpels leaflike but still fused in central flower (petals removed). Right hand lateral flower shows reduced green ovary. C. Carpels leaflike but still fused. D. (All petals and 1 calyx lobe removed.) Phyllody of carpels well developed. Three petioles fused and two fused separately.

In some cases the carpels become foliaceous. The phyllody of the carpels is of particular interest in that many degrees of development of the foliaceous condition may be seen in infected plants. Plates 1 (B, C and D) and 2 (A and B) illustrate some of the variations of this condition. In the extreme condition, the five carpels develop into leaves with a hollow petiole up to 6 cm. long and a peltate lamina not unlike that of a normal foliage leaf except that it is practically undivided. These carpellary leaves apparently all rise in one plane. One flower examined showed four instead of five carpellary leaves, two of them 4 cm. long and two 2.5 cm. long (Plate 2A). Within the whorl of carpellary leaves the receptacle looks exactly like a normal growing point with the young leaves rising in a spiral.



Plate 2.

Yellow-erinkle infected flowers. Left: Flower with 4 carpellary leaves, 2 small and 2 long. Right: Phyllody of carpels very well developed; 4 of the petioles are partly fused, but are easily separable.

Between this extreme condition and that described above for the majority of infected flowers, various degrees of fusion may be present in the petioles of the carpellary leaves. Some are completely connate with only the laminae free; in a few instances they are fused to the tips of the laminae as well, though there is marked difference in texture and venation between the petiole and the laminae. Some specimens have the petioles connate at the very base and the remainder more or less fused, separating easily and without apparent damage to any tissue (Plate 2B).

When phyllody of the carpels is well developed the leaf blades present characters reminiscent of virus symptoms in foliage leaves. For example, the blade may be cupped upwards, sometimes blistered or bullate, the veins slightly raised, and the main vein thickened and raised and with a finely zigzag path.

The condition described is similar to that observed in plants infected with the tomato big-bud virus (*Lycopersicum virus 5*). Field evidence suggests that the yellow-crinkle virus is identical with this virus and experiments to examine this suggestion are in progress.

The reversion of carpels to leaves is of interest to botanists in that it lends weight to the classical theory of the foliar origin of the carpel.

REFERENCE.

- SIMMONDS, J. H. 1938. In Queensland Department of Agriculture and Stock Agricultural and Pastoral Handbook, Vol. III. Brisbane: Government Printer.