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DWARF FRUIT TREES

By F. MELVILLE, B.Sc. (Agric.), Adviser (Fruit)

In this country where most fruits and particularly apples and pears are grown without irrigation, heavy crops and summer stress restrict tree size. The aim of most growers therefore, has been to grow larger trees and little interest has been shown in trees with dwarfing tendencies. However, in countries with ideal conditions for growth, trees tend to grow too big and become uneconomic in terms of labour costs.

This is particularly so with apples in the United States of America where the use of seedling stocks has resulted in extremely large trees which are awkward to prune and spray, and expensive to pick. In the United Kingdom and Europe seedling stocks for apples went out of use many years ago for this very reason and the only relics to be seen are standard trees in the old farm orchard. English growers have taken advantage of the selection of apple stocks developed at the East Malling Research Station in the 1920's to produce small trees on such stocks as Malling II, IV and the very dwarfing IX. Malling IX is also widely used in continental countries such as Holland.

There are certain advantages in small trees. Cropping commences earlier, the fruit is within easy reach, the tree management is simplified and more trees can be planted per acre giving a greater yield especially in the early years. Trials were seen in England last year with as many as 1,350 trees to the acre planted in hedgerow fashion and trained as dwarf pyramids. Production per acre in the first 10 years was three times that for an orthodox wide planting on a more vigorous stock. In Holland too, advantage was being taken of the dwarfing effect of Malling IX, to close plant trees developed on the spindle bush system. The main use of dwarf trees in England, however, is as interplants in an orthodox orchard to boost production in the early years. By this means per acre yields are almost doubled in the first ten years after which the interplants are removed if crowding has occurred.

A trial planting of Golden Delicious on Malling IX trained on a trellis in a Washington orchard U.S.A. was expected to yield something approaching 500 bushels per acre—that is one bushel per tree in the second year. In Canada too, trials have given good results. Although the trees are dwarfed fruit size is quite normal. However, Malling IX has a rather poor root system and trees need stacking. The Americans have a method of overcoming this problem by using a seedling root and
grafting a small section of a dwarfing stock into the stem thus producing a dwarfing effect without the disadvantage of a poor root system. Either Malling IX or VIII are used as the stem piece the latter in the well known “Clark Dwarf” which also incorporates a section of Virginia Crab in the lower stem to resist cold.

The East Malling selection Malling 26 which is much better anchored and only slightly more vigorous may prove a suitable substitute for IX.

Pears can also be dwarfed by working on quince roots. This also encourages earlier cropping and is used to advantage in the United Kingdom and Europe. The Bartlett, however, makes a very unsatisfactory union with quince and to overcome this difficulty it is necessary to use an interstock of another pear variety such as Beurre Hardy. Very little of the interstock material is necessary to give a satisfactory union. In one technique known as “double budding,” portion of a bud shield of the interstock is inserted into the normal T cut in the quince stock followed by a normal bud on top. The small section of bark and cambial tissue of the interstock between the quince and the Bartlett bud is sufficient to produce a perfectly satisfactory tree.

But what is the possible value of dwarfing stocks here? For apples we have long used Northern Spy which has slight dwarfing tendencies and gives early cropping. The present trend is towards seedling stocks which can be expected to produce large trees under favourable conditions and may be slow to crop unless handled carefully. The main use of dwarfing apple stocks would be to enable closer planting giving greater and more economic yields. Overseas evidence indicates that provided soil moisture is adequate serious tree competition only results from lack of sufficient light so that provided the trees are irrigated and have enough growing space production should be unaffected by proximity to adjacent trees. The most practical type of planting is a rectangular system allowing working room between the rows with trees planted close within the rows.

A range of apple stocks was imported in recent years by the Department and among these are a few semi-dwarfing types. As sufficient trees become available close planting trials will be initiated.

RESIDUAL VALUE OF TRACE ELEMENTS
How Frequently Should Trace Elements be Applied to Soils?
DEPARTMENT OF AGRICULTURE RECOMMENDATIONS
Prepared by Plant Research and Animal Divisions

Over the last 30 years the magic of trace elements has converted millions of acres of wilderness into productive farmlands. To many farmers copper, zinc, manganese, molybdenum or cobalt has spelt the difference between disaster and security. Today the question is “How often should dressings be repeated?” Information on this aspect is being accumulated, but as it is not complete the following are interim recommendations.

COPPER
This element is needed by both plants and animals. However, the grazing animal requires a higher level of copper in the herbage it grazes than the plant requires for maximum growth, so sufficient copper must be applied to copper deficient areas to keep the level in the pasture high enough for maximum animal production.

It is therefore considered that pasture grown on an area known to be copper deficient should be topdressed with copper again five years after the initial application. On each occasion one bag (187 lb.) per acre of the standard super copper mixture should be used. This mixture contains the equivalent of 9½ lb. of copper sulphate per bag: the copper compound used is ground copper ore of an oxidised type.

After the deficient area has been treated with two evenly applied dressings, copper need only be applied at ten year intervals, unless there is positive evidence of copper deficiency in the stock. Copper toxicity can occur in stock and is a potential danger if applications are repeated too frequently.

Except on three groups of soils which are limited in distribution there is no experimental evidence that copper is needed more than once for cereal cropping or pasture production. The limited areas where present information indicates that the standard application of copper should be repeated with each cereal crop, or every five years on pasture, are:

(a) The coastal soils high in lime. Cereals are grown on the Dongara and West Northampton examples of this type.

(b) The main soil types of the Dandaragan and Gingin districts. Among these are the grey to brown coloured light soils of the flats which carried mainly flooded gum, and the red sandy soils originally carrying red gum and banksia.
ZINC
There is no evidence that zinc application to zinc deficient areas is needed more than once for crops or pastures except to ensure even distribution. The zinc application should be at one bag (187 lb.) per acre of the standard super zinc mixture which contains approximately 3 lb. of zinc oxide. It appears that the small quantity of zinc in ordinary super will provide a "maintenance dressing" and prevent the deficiency recurring.

MOLYBDENUM
There is no evidence in Western Australia of a response to more than one application of molybdenum provided the initial application is at a rate of 2 oz/ac of molybdenum oxide. This quantity of molybdenum is contained in one bag (187 lb.) of the standard super molybdenum mixture. It is very important to topdress molybdenum super evenly as the dressing is unlikely to be repeated.

Molybdenum can quickly build up to a level in the herbage which is toxic to stock and further dressings should only be used when there is positive evidence that the area has become deficient again. Only in limited areas of Australia is there substantiated evidence of a need for second molybdenum applications.

MANGANESE
Manganese deficiency mainly affects cereals on certain soils. There is no evidence that manganese applied with the super has any residual value and applications should be repeated with every cereal crop sown. Manganese super is normally used at a rate of 90 lb./acre—although on virgin soils higher phosphate applications would be an advantage. It has been found that 14 lb. of manganese sulphate per acre is quite satisfactory for most deficient areas. The standard manganese super mixture contains 28 lb. of manganese sulphate per bag (187 lb.). The position with subterranean clover is possibly different and is at present under investigation. Manganese deficiency affecting sub. clover is not a major problem.

COBALT
Cobalt is needed by stock, but not by plants, as far as is known at present. A deficiency is cheaply corrected by an application of super containing cobalt. If applied at a rate of 90 lb./ac. (i.e., 3 oz. cobalt sulphate per acre) the deficiency should be overcome for three seasons. The dressing should then be repeated.

Cobalt can also be given to stock as either licks or cobalt bullets. The economics of these methods compared with applications to the pasture depend on the carrying capacity. Where the carrying capacity reaches or exceeds a sheep per acre, it is cheaper to apply cobalt to the pasture than to use cobalt bullets.

Bulletins on trace elements available from the Department of Agriculture are:

- 2529.—The Use of Copper & Zinc in the Cereal Growing Districts of Western Australia, by W. J. Toms (Jour. Agric. West Aust., 1958. 7. (Third Series), No. 2, 197-203).
- 2650.—Cobalt Deficiency in Sheep and Cattle. Treatment using Cobalt "Bullets" by A. W. Williams. (Jour. Agric. West Aust. 1959, 8. (Third Series), No. 4, 389-393).
- 2682.—Copper and Cobalt Deficiency of Livestock in Western Australia, by H. W. Bennetts (Jour. Agric., West Aust., 1959, 3. (Third Series), No. 6, 631-648).

THIEVES OF GRAIN
Rome, Italy. It is estimated that rats, mice, insects, and fungi destroy enough food every year to feed 250 million persons for a year on a daily ration of about two pounds of cereal products.

The Food and Agriculture Organisation says in 1958 world production of all grains was 856 million metric tons, that the rodents, insects, and fungi “consumed” about 85.6 million tons and that “In a world in which millions still go hungry the reduction of such losses of food could play a significant part in the struggle to increase world food supplies.”

In United States it has been estimated that each rat feeding on stored grains costs the farmer six dollars a year.
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