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H R. Powell
Department of Agriculture

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THE PRUNING OF FRUIT TREES

By H. R. POWELL, B.Sc. (Agric.), Superintendent of Horticulture

PART 1—GENERAL PRINCIPLES

In this series of three articles, an attempt is being made to explain the principles of fruit tree pruning, together with some of the difficulties likely to be encountered. The subject will be treated under three main headings in the following order:—

1.—General Principles; 2.—Framework Pruning; 3.—Pruning of various kinds of fruit trees with special reference to treatment of fruiting wood. This first section will be confined mainly to stating the reasons why pruning is considered necessary and will describe the terms used to indicate the various parts of the tree.

The second article will discuss framework pruning. The framework, as the name implies, consists of the permanent portions of the tree such as the trunk, main branches and leaders. The provision of a sound framework is of paramount importance as mistakes made in the early training of the tree can shorten its bearing life and seriously affect production.

The third section will deal mainly with the treatment of fruiting wood, and each kind of fruit tree will be described separately. At the same time the reader will be given information which will enable him to maintain the framework at each annual pruning.

It is obvious that articles of this nature cannot hope to supply the answers to the many difficulties which constantly arise when the trees are being pruned. Fig. 1 illustrates this very well. It is considered, however, that an understanding of the principles involved will help to solve many of the difficulties, especially if the growth and fruiting characteristics of the trees have been carefully observed.

Most of the illustrations used for the section on framework pruning purposely include photographs of difficult trees which for various reasons had not been trained correctly.

Some of the illustrations used to explain the treatment of fruiting wood in the third section, are examples of pruning by experienced fruit growers. The names of those who provided examples include, Mr. Hammond Cross of Bedfordale (peaches); Mr. R. C. Owen of Carmel (peaches and Japanese plums); Mr. George Parke of Donnybrook (apples) and Mr. A. Clothier of Mt. Barker (pears). In addition, various departmental officers assisted generally and they include, T. F. Herlihy, R. L. Calles, A. T. Gulvin and N. Brockman. All the photographs used for illustrations were taken by Mr. C. Balmer, Government Photographer.

REASONS FOR PRUNING

For many years pruning has been a recognised principle for successful fruit culture. It possibly commenced as a means of regulating the size of the trees and to restrict the production of inferior fruit on branches touching or dragging on the ground. It was probably found later that if the branches were thinned out, bigger fruit of better quality could be produced.
From the old methods used, the present systems have been evolved. They differ, however, in various countries. Climatic, soil and economic factors play an important part in the evolution of suitable systems. In England, among other systems high-headed trees or standards are grown extensively. Stock can graze beneath such trees without injuring the fruit and foliage.

Under Australian conditions this type of tree would not be successful, as the long exposed trunks of the trees would be burnt by the fierce heat of the Australian summer. Consequently a system more suitable to Australian conditions has been evolved. Here the trees are low-headed with trunks ranging from 9in. to 18in. in height. The susceptible bark is thus protected from sun injury by the low-hanging protective foliage.

Pruning can be defined as the cutting away of portions of a tree for the purpose of increasing the economic value of the remaining limbs. It will be noticed that pruning is not defined as just cutting. The definition implies a knowledge of the parts and functions of the tree and without this knowledge no one can expect to prune his trees correctly.

Pruning, as far as ornamental and garden trees and shrubs are concerned, consists of trimming and shaping the plant into some artificial form. This does not apply to fruit trees as the form obtained, often of a very symmetrical nature, is only incidental to other more important functions. There are many people who, realising that pruning is necessary, merely shorten or cut back all the annual growths of the tree. This system, if it can be called a system, results in a crowding of the limbs and the resultant tree is nearly always in a worse state than if it had never been pruned.

Those who have observed closely, old unpruned trees will no doubt have noticed the tendency for the fruit to be borne on the extremities of the branches. Heavy crops of small fruits are followed by seasons when no fruit is produced at all. The interior of such a tree is dark and dense. Limbs criss-cross and there is a considerable amount of dead wood. Sunlight and ample supplies of air are essential for the normal development of every fruit tree.

No bud, leaf, spur, or branch will mature properly if the foliage is too dense, or if the tree is too shaded by buildings etc. Sunlight supplies the energy, which enables the carbon-dioxide of the air to be elaborated into plant food. In addition, oxygen is
required for respiration. Trees, like animals, breathe, and every part of the tree is provided with tiny pores through which the air can penetrate. If supplies of air and light are restricted it is obvious that the parts of the tree affected will not be able to develop properly. (See Figs. 2 and 3.)

Pruning should therefore be a guiding and thinning process. It is founded on the fundamental functions of the tree and is designed to even out the struggle each branch has to make for its existence. By the regulation of the number and the spacing of branches by pruning, every branch on the tree is given an equal chance of obtaining its requirements of air and sunlight. (See Figs. 4 and 5.)

In addition to the training of branches, pruning is also used to regulate the amount of fruit carried by the tree. During certain years, even systematically pruned trees become clustered with fruit buds and spurs. Should all these flower and set fruit as they very often do, the resultant crop would be far too heavy for the tree to carry.

The regulation of the amount of fruit carried by the tree by pruning, and subsequently by thinning, has a very strong influence on the succeeding year’s crop. Most kinds and varieties of fruit trees if heavily cropped one year tend to set very light crops the following year. Intelligent pruning will thus help to even out production and minimise the alternate bearing of heavy and light crops of fruit.

There are many pests and diseases which the fruit grower has to contend with and it may be necessary for him to spray the trees a number of times each year. If they are unpruned it would be very difficult to cover every part with a protective spray material owing to the density of branches and foliage. An intelligently pruned tree has well spaced branches and it can be sprayed with the minimum of cost and effort. It must be remembered however that although many orchard trees are pruned into symmetrical shapes that are a delight to the eye, fruit trees are grown primarily for profit. Symmetry of the branches, though important, is not essential for successful fruit production.

Pruning is thus designed to achieve certain specific objects. These can be summarised as follows:—

(a) Pruning is a guiding and thinning process, by which the branches are so spaced, that ample supplies of light and air are available to every part of the tree.
(b) Pruning, by regulating the amount of fruiting wood on the tree, can improve the size and quality of the fruit.

(c) The system of pruning evolved under Australian conditions ensures that spraying and picking operations can be carried out on the most economical lines.

DEFINITIONS

Certain terms are used in pruning and for the sake of convenience they can be described as follows:

Collar: The collar is the union between the root and trunk.

Trunk or Main Stem: The trunk extends from the collar to the first subdivision of the branches or mainarms. Under Western Australian conditions it varies between 9in. and 18in. in height.

Main Arms: The main arms are formed from the first subdivision of the trunk, when the young tree is planted. If a two year old with a branched head is planted, two to four well spaced branches arising from the trunk, are selected. These branches are shortened back and all other branches are suppressed. These branches subsequently form the main arms of the tree (fig. 7). In the case of “Whips”, one year old unbranched trees, the main arms are secured in the same way after heading back and the first year’s growth in the orchard.

Secondary Arms: The secondary arms are branches arising from the main arms and they are usually selected when the young two-year-old tree is next pruned after a year’s growth in the orchard. The number usually ranges between four and eight and is actually a doubling up of the main arms. In practice this does not always eventuate. (See fig. 7.)

Leaders: The leaders are theoretically selected from branches arising from the secondary arms. In actual practice they can arise from the main arms or trunk. The number usually varies from eight to sixteen. The leaders together with the main and secondary arms form the permanent framework of the tree.
tree, and they should be carefully maintained at each year's pruning. (See figs. 4, 5, 7.)

Laterals: These are shoots arising often horizontally from the main arms, secondary arms and leaders. They are the main fruit-bearing parts of the tree. When they are strong-growing, often inclined to be vertical in growth, they are known as "wood shoots".

Wood Shoots: Selected wood shoots are used to extend the leaders at each annual pruning. They may be used to form sub-leaders and in some cases they are retained to replace damaged leaders. (See fig. 7.)

Water Shoots: Strong-growing wood shoots arising from dormant buds on old wood are known as water-shoots. Their presence usually indicates that the previous pruning has been too severe. They may also arise as the result of injuries to the main branches.

Buds: Buds are found at regular intervals along the annual wood growth. They are to be found at the base of each leaf. When on the older wood, they are known as dormant buds.

Fruit Buds: These are buds produced during the previous year's growth which will, in the spring, produce flowers. Their structure varies a great deal with the different kinds of fruit trees. Fruit buds on the apple are very distinct in structure from fruit buds on the peach; fruit buds on the peach again are very different from the fruit buds on the plum and so on. These differences will be stated in detail later on.

Leaf Buds: As the name suggests leaf buds are not primarily concerned with fruit production. They give rise to twigs which may carry fruit buds the following year. They are of value for the replacement of laterals and for the production of wood shoots. In addition they are important for the reason that from them, fruit spurs are developed.

Fruit Spurs: These are short growths produced from leaf buds. They are to be found on many kinds of fruit trees; on stone fruits the fruit spur terminates in a leaf bud, which enables subsequent growth to take place. In the case of apples and pears, the fruit spur is always associated with a terminal fruit bud. The fruit bud in this case as will be explained later can continue the growth of the spur.

Leaf Spurs: The leaf spur is the transi-
Pig. 5.—A 43-year-old Bartlett pear tree at Illawarra Orchard. This tree provides an excellent contrast to the tree shown in Fig. 3. Picking and spraying can both be done efficiently.

Fig. 6.—An old Granny Smith. The owner is seen painting large wounds as a result of shortening back some of the leaders which were affected with Die-back. The paint consists of Bordeaux paste. Grafting mastic on fresh wounds and old white lead house paint on old dry wounds also minimises dangers of entry of wood-rotting fungi. Bordeaux paste is made by dissolving 1½ lb. blue-stone in 1 gal. water; 3 lb. quicklime is slaked with 1 gal. water, then poured together and thoroughly stirred.

or concave steel-edged holder, should come in contact with the severed portion which falls to the ground. This is particularly important with regard to the larger limbs, as if the position of the blade were reversed, the retained portion would be bruised through contact with the holder.

The cut made by the secateurs should commence on a level with the base of the bud directly behind it, and the cut should then slope towards the bud and finish just over its apex. Long oblique cuts are very unsightly and if made too low behind the bud the resulting shoot will be weakened and useless. If the cut is made too far above the bud, the healing of the wound will be delayed.

PRUNING TOOLS

In addition to a knowledge of the growth and fruiting characteristics of the tree to be pruned, whether it be an apple or a peach tree, the pruner must use the proper tools and keep them in such a condition that they will make efficient and clean cuts. Good quality secateurs should be obtained and two types are shown in Fig. 8. The blade of the Resier type should be sharp and be capable of cutting limbs up to 1½ in. in diameter. When making the cuts, the blade should always be held against the part of the limb or branch which is to be retained. The hook,
Fig. 7.—A young Cleopatra apple tree, showing the development of short trunk, main and secondary arms and leaders. When the two year branched tree was planted, three branches were retained and pruned to form the future main arms. At the next pruning, following a year's growth in the orchard, two shoots on each were retained, and pruned to form the secondary arms. This is shown clearly on the main arm in the centre of the tree. One secondary arm from main arm on the left of the tree has been lost by accident and on the right of the tree one secondary arm is covering its companion.

During the subsequent year's growth, strong shoots (wood shoots) have arisen from the extremities of the secondary arms. From these the framework will be extended and those used will in future be called leaders (short for leading shoots).

The removal of the longer shoots by the secateurs can be facilitated if the pruner exerts pressure with one hand on the portion to be removed against the cutting edge of the secateurs, whilst he is making the cut with the other.

The pruning saw is necessary for the removal of the larger branches. In well-pruned orchards its use is seldom necessary, except for the removal of broken and damaged leaders. When the saw is used however, it should be clean and sharp with the teeth evenly set.

When any branch is suppressed, the cut either made by the secateurs or the saw, should be made flush with the limb, from which it was removed. Jagged wounds never completely heal over, and they lie at the mercy of many kinds of wood-rotting fungi. These fungi can ultimately cause the death of the limbs affected, and later on the death of the tree itself. Every person engaged in pruning should carry a sharp knife which should be used to clean up all large wounds, to facilitate their subsequent healing over. Large wounds after being trimmed should be painted over with Bordeaux paste, or grafting mastic. (See Fig. 6.)

(To be continued.)

Fig. 8.—Two types secateurs are shown. On the right the Resler type and on the left the Roll-cut. The Roll-cut is easier to use but is not so suitable for making cuts in narrow spaces. A tube from a milking machine makes an excellent grip—seen on right handle of Roll-cut.

A REMINDER

HAVE you registered your orchard? One fruit tree or a single vine is an orchard for the purposes of the Plant Diseases Act and must be registered accordingly. The registration fee for less than one acre of trees or vines is 1s. Apply Department of Agriculture, Perth.
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