'circuits,' each having an agent who deals direct with the central office. In such circuits county agents, Department of Agriculture—field men, home demonstration agents, club leaders, and other extension workers are organized and films are sent from one to the other. The Department co-operates with State or—Federal Institutions in arranging these circuits, and in preparing the programmes of films which are to be sent through each area. Arrangements have also been made whereby individuals or organizations may buy prints of the Department's films at manufacturing cost. State Agricultural Colleges, extension organizations, public school systems, farmers' organizations, and boards of trade have in many cases formed their own libraries.

In France a large sum was set aside in 1923 for the use of the Ministry of Agriculture for the creation of a permanent Agricultural Cinema Commission to investigate new ways of using the cinema for the guidance of farmers. A central bureau was formed, under the direction of this Commission, for the production and distribution of agricultural films. This bureau has, since its foundation, formed a library of 237 different films illustrating modern practices in all branches of French farm work. The films are designed for practical instruction and, unlike many of the American films, are not popular descriptions of farming for lay audiences. The library of the central bureau contains several copies of the more useful films, and, altogether, some 2,500 reels. Thirty to forty of these are sent out daily to various parts of France, and as many as 15,000 loans have been arranged in the year. This represents 60,000 presentations of instructive agricultural films before farmers in a single year. The development of the use of the cinema in agricultural France is further evidenced by the fact that 60 of the agricultural schools and colleges and 500 local centres have been fitted with cinema projectors at the expense of the bureau.—*The Journal of the Ministry of Agriculture.*

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PRACTICAL HINTS ON GRAPE CULTURE

BY

B. S. NIRODY

The cultivation of grapes in South India is not as extensive as it deserves to be, largely because it involves a little technique in pruning which, though simple, is beyond the comprehension of the ordinary *mali*, unless he is specially instructed in the art.

The varieties which are well-known for their quality in the northern latitudes are naturally unsuited for cultivation on the plains in this part of the country, but there are sufficiently hardy kinds which, if properly grown, give fairly good results under sub-tropical conditions at medium elevations, and to a lesser extent, are also successful at low elevations.

The varieties known as 'Aurangabad' and 'Krishnagiri' are the best suited for the low elevations including the plains down to sea level, but it is mainly at elevations above 1,000 feet and at stations a few miles away from the coast that they are the least exacting in their cultural requirements. With

a little greater attention to accuracy in pruning, the varieties grown in the climate of the west can also be grown at elevations above 3,000 feet, and some of the best known American varieties such as the Concord and the Delaware, which are easily imported from Australia, are well worth growing at stations with a climate like that of Bangalore.

The secret of success with grapes is largely in the art of pruning, and the vines demand continual care in this respect. Neglect in any one season not only results in the failure of the crop during that season but leads to difficulties in pruning during the subsequent one or two seasons. Hence the necessity of knowing how to handle a grape vine from the time it is planted.

The grape vine is easily propagated by cuttings taken from the mature wood of the current season's growth at a time when the vine is resting or has become almost leafless during the winter. Each cutting should have two to three eyes or leaf buds on it. It should be cut at its lower end immediately below a node, and at the upper, immediately above a node. These cuttings are best put down in a pan filled with either pure river sand or a mixture of sand and leaf mould, and buried in this material in a slightly slanting position and preferably close to the sides of the pan, to the depth of about two-thirds of the length of the cutting and placed in a shady place. As soon as they have rooted (in about four weeks), they should be potted up singly in 4″—5″ pots in the ordinary compost for pot plants and well established in these pots before they are planted in the ground.

The holes for planting the vine should be fully 4′ × 4′ × 4′ and the soil from the pits thus prepared should be mixed with a liberal quantity of well rotted farm manure as is done for planting fruit trees. The newly planted vine should be given a firm stake to a height of 6 feet, and its further growth should be supported by means of a trellis or pergola of a horizontal or *pandal* type, which should be made of lath or bamboo. In the northern latitudes, the practice usually is to train the growing vine as close to the ground as possible, in order that the radiating heat from the soil may help to bring the crop to maturity in as short a period as possible. In a hot climate like ours, the vines should be trained about 6 feet or higher from the ground in order that the radiating heat may not prove excessive to the young growth and the fruit.

At the end of the first season's growth of a vine after planting a rooted cutting, the vine should be cut back to two eyes. If both these grow, the weaker shoot should be rubbed off after the stronger one is well established. The growth made at this stage should form the main trunk of the future vine, and pruning in subsequent seasons should consist of cutting back part of the new wood so as to throw all the vigour of the plant into the few buds that are saved. This is effected by one of two courses: Of all the many shoots that grew during the season immediately prior to the pruning, only two *strong*, healthy ones are retained and these too cut back to about eight eyes on each and all the other shoots are removed right to their base.

An alternative course is to save all the strong shoots of the current season's growth prior to pruning, and to cut these back to one or two eyes on each shoot. The vines should be liberally manured at this stage with fish guano or with superphosphate and watered liberally. The fruit clusters appear close to the base of the new shoots from the pruned vine, and usually on the under side of the trellis. At this stage, i.e., when the young fruit is rapidly growing

it is sometimes attacked with mildew and should be promptly sprayed with Bordeaux mixture.

The manuring should be done each time the vine is started for a new crop. About 1 lb. of potash, 2 of bone meal and 10 of oil cake should suffice for an average sized vine at each application.

When the main trunk gets old and the vine shows lack of vigour, it can be renovated by saving any strong new shoot from the base and retaining only half the usual wood on the old trunk for fruiting. In the subsequent year the new shoot can take the place of the old trunk and be treated as a newly planted vine.—*Madras Mail.*

PLANT AND SOIL RESEARCH

BY

SIR JOHN RUSSEL, F.R.S.

Opening the discussion on soil fertility and its control, Sir John Russell, F.R.S., defined a fertile soil as one which satisfies all the conditions of plant growth, adequately supplying plant nutrients, water, warmth, air for the roots, space for the roots, free from undesirable substances or harmful reaction. The supply of plant nutrients affects crop production in two ways. Other conditions being favourable the amount of plant growth is increased with increasing supply of nutrients up to a certain point. The relationship is not simple; it can be expressed by two factors, one being the minimal amount on the crop of the particular nutrient, and the other the supply of the nutrient already present in the unmanured soil. Some degree of proportionality between the various nutrients is necessary, but there is no evidence that the ratios are narrow. These relationships are much affected by the water supply. In general, nutrients are most effective when there is a good water supply, and the water is most effective when there is a good nutrient supply. A good water supply thus economises the nutrients, and conversely a good nutrient supply economises water. For fruit the relationships are somewhat different, fruiting and growth being in some ways antagonistic. These relationships are important in irrigation practice.

The second way in which nutrients affect the plant is to change its composition, habit of growth, and response to external conditions, including the attacks of insect and fungus pests. So long as the proportion between the different nutrients is such as to give a normal plant, variations in the total amounts have but little effect on composition or habit of growth; the individual plants may be larger or smaller, but the material of the plant is not much affected. As soon, however, as the proportion of any one element falls too low, certain characteristic effects are produced on the plant, which may profoundly alter its reaction to external conditions, and its chemical composition, and therefore its agricultural value.

In certain conditions any of the elements may thus be in deficiency. Considerable investigation has been made to discover the effects of these