c. Study of genetics and inheritance of the fruit and nut species.

Most of the work involves seedling growing but some work is starting in induction of mutations. With the establishment of the radioactive cobalt source on the campus, more work is contemplated. However, there is some doubt as to whether potential usefulness of this method is as great as conventional methods. Probably it will be useful in particular types of plants or in achieving specific objectives.

My own work deals mostly with almond breeding and I would like to tell you something about our efforts relative to the production of hybrids between peach and almond. One of our objectives is to transfer self-fertility from peach to almond; another is to use the F1 hybrid for rootstocks. The F1 hybrid is uniform, vigorous, and involves possible useful characteristics, such as nematode resistance and resistance to lime-induced chlorosis, depending upon the particular combination of parents.

Methods of production have not been developed to commercial usefulness. Vegetative propagation is variable depending upon the individual clone. Tests have shown that the almond parent is literally impossible to root by soft or hardwood cuttings; the peach parent can be rooted by softwood cuttings under mist and to some extent by hardwood cuttings; but the hybrid offspring seedlings tested have shown a range of from poor to good rooting.

Seed propagation may be possible through controlled cross-pollination. To date it has not been achieved in high proportion through hand pollination in our tests.

The F2 hybrid population is very heterozygous and seedlings are extremely variable. These could not be used as rootstocks but might be useful for other purposes.

We have also produced more complicated hybrids mostly involving backcrosses to almond. Some individual clones of these are being considered for their ornamental value. Potentially valuable characteristics for which we have selected include double flowering, vigor, fruitlessness, and some degree of resistance to peach leaf curl.

(Slides were used to illustrate this material)

PRODUCTION AND PROPAGATION OF ROOTSTOCKS

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I will limit my remarks to some of the vegetative methods of propagation that we are using for fruit tree rootstocks.

In the June, 1963 issue of the "Plant Propagator" Dr. H. T. Hartmann, Dr. W. H. Griggs and I published an article de-

scribing methods of rooting Old Home and Bartlett pears for use in areas where pear decline is a problem.

The method for Old Home consisted of taking the cuttings in late October and treating them with IBA (100 ppm for 24 hrs. or 2000 ppm quick dip). Following treatment the cuttings were stored for about 3 weeks in moist peat moss at 70° F. and then planted in the nursery. About 72% of the cuttings rooted.

The Bartlett pear would not root satisfactorily by the method used for Old Home. It was necessary to take the Bartlett cuttings in late November and hold them upright in peat moss over bottom heat, but with the tops exposed to winter chilling conditions, for 3 weeks before planting. Best rooting was obtained with bottom heat of 75°F. and an IBA treatment of 150 ppm. About 47% of the cuttings rooted.

The method used for the Bartlett pear also showed good results in 1964 with some of the English apple rootstocks. Up to 63% rooting was obtained with some of the clones when IBA was used at the rate of 100 ppm. We will repeat the work next year.

We would like to propagate some of our root-knot nematode resistant peach and peach-almond rootstocks by means of hardwood cuttings but the methods we developed for pears do not work. In some cases, up to about 65% of the cuttings produced roots, but only from 2 to 13% survived in the nursery, (45 ppm 24 hour-soak and 4000 ppm IBA-quick dip).

This year we treated hardwood cuttings of 25 nematode resistant peach selections with IBA (4000 ppm quick dip) and IBA plus a dip in 50% Captan. The cuttings were planted directly in the nursery row. In all the 25 selections the IBA plus Captan gave better results than the IBA alone. The average survival was 22% for the IBA and 67% for the Captan and IBA. The cuttings were taken from young trees so the rooting was probably better than if they had been taken from old trees. However, the Captan apparently helped to make the cuttings grow, so we plan to try more of it at various concentrations.

All the species of fruit trees that I have mentioned can be propagated with the use of IBA and intermittent mist, but this method requires more labor and equipment than in the case of hardwood cuttings. However, I told you on your field trip to Davis that we find softwood cuttings very useful in our root-knot nematode resistant rootstock trials.

I am sure that we will continue to use seedlings for rootstock purposes in many cases, but more vegetative methods will be used in special cases as we perfect them.