more varieties of apples into the allotted space.

But dwarf fruit trees have their disadvantages, too.

Dwarf trees are more expensive than standard trees. Young dwarfs cost up to twice as much as standard trees at commercial nurseries. This is a greater difference than it seems at first sight, because more trees on the same plot of land mean more money put out. To illustrate, four standard apples grow in the same space needed for 40 dwarfs. If the standard apple trees cost $1 each, you would invest $4 in trees to plant the area. But to plant the same ground in dwarf apples at $2 each would cost $80!

Dwarfs require more personal attention than the sturdy standards. Very often their root systems are not strong enough to hold up the weight of limbs, and artificial supports are needed. And dwarf varieties are generally shorter-lived than standard fruit trees.

However, most of these objections are important only to the commercial orchardist. The average home grower will have no need for such large numbers of trees that expense becomes prohibitive. Neither will the question of care prove a burden, because the only garden hobbyists that succeed in growing anything anyway, from petunias to oak trees, are those with time and interest to tend their gardens properly.

Directions for Grafting

Most authorities will recommend that you start out with dwarf fruit trees already developed in a commercial nursery. But if you are dead set on doing your own grafting, here are a few elementary principles.

Choose a good dwarfing rootstock. This is of the greatest importance, as the success or failure of the dwarf tree depends on this selection to a great extent. Your nurseryman or state agriculture department can advise you where and how to find the right rootstock.

Buds should be grafted in late July or August. Make a T-shaped cut into the rootstock bark about four inches above the ground. Meanwhile, prepare a bud shield by slicing off a small piece of bark containing a bud from the juncture of a leaf stem of the standard fruit you want. Then slip this bud shield into the T-cut, and bind the wound with raffia, string or rubber bands to hold the two parts in close contact. The ties can be cut away in 10 days.

Next spring, just before growth will start, cut off all the rootstock above the grafted bud shield. This gives the bud all the growing force of the plant, and it should sprout vigorously in a little while. Make sure that any growths from the rootstock are cut back.

The following spring before growth starts, prune back the branches of the new dwarf tree and transplant it to the orchard if it looks strong enough.

From this stage on, whether you yourself raised it this far or whether you bought your plant, just keep your dwarf tree pruned, thinned, properly supported and mulched, and sprayed—and get a bushel basket ready for your home harvest.

Science News Letter, March 21, 1953

BIOCHEMISTRY

Fat Chemical Protects From A-Bomb Radiation

➤ PROTECTION AGAINST damage by radiation from X-rays to atom bombs is given by a chemical found in fats. The chemical is linoleic acid.

Discovery of its ability to protect against radiation damage, in rats at least, was made by Drs. Harry J. Deuel, Jr., Amber L. S. Cheng, George D. Kryder and M. E. Bingemann of the University of Southern California, Los Angeles, in research supported in part by the Atomic Energy Commission.

A very small amount of this chemical taken daily enabled male rats exposed to damaging amounts of X-rays to survive for an average of 74 days, compared to a 53-day average survival time for rats without the fatty acid. The female rats survived an average of 74 days with the fatty acid, compared to 58 days without.

The differences are even more significant because the rats given the fatty acid got bigger doses of X-rays than the ones without the fatty acid. The male rats had 45% greater exposure to the X-rays and the females 17% greater.

The experiment was stopped at the end of 14 weeks. The protective effect of the linoleic acid would have shown up as even greater if the experiment had gone on longer, the scientists say. At the end of the 14 weeks, only eight out of the 71 rats in the non-fatty acid group survived, compared to 30 out of 72 in the group that got the fatty acid.

Why this fatty acid protected the rats against radiation is not now clear, the scientists state in *Science* (March 6). But they point out that this and a number of other substances that have proved effective in protecting against radiation damage are substances of considerable importance in nourishing the skin and keeping it in good condition. The other substances are cystine, ascorbic acid, or vitamin C, and vitamin P.

Science News Letter, March 21, 1953

RADIO ASTRONOMY

Meteor Trails Miles Long in Upper Air

➤ METEORS LEAVE trails behind them, when they enter our atmosphere, some 15 to 18 miles long.

The length of these columns of ionized air, only a few yards in diameter, has been measured through the use of two radio telescopes, one on the Stanford University campus, and another 60 miles away at Turlock, Calif. In all, more than 1,700 meteors were detected in a five-and-a-half-hour period and used for measuring purposes. Calculations, reported in the *Transactions, American Geophysical Union* (Feb.), showed that only 73 of these meteors could be said to have produced echoes at both stations, however.

From comparing the echoes from the two stations, L. A. Manning, O. G. Villard, Jr., and A. M. Peterson of Stanford were able to show that the mean length of the meteor trails was between 15 and 18 miles, and that some trails were probably as long as 30 miles. Their measurements were made at 23 megacycles.

Science News Letter, March 21, 1953