seed bed—it must have good, very rich soil in fine tilth, be protected from winds, and yet well exposed to sunlight; the southern or south-eastern slope of an open place in a forest is often selected. Hot beds are made when necessary. A bed with an area of about 50 sq. yds. is adequate for 1 oz. of seed. To destroy the seeds, &c., of weeds, and the larvae of insect pests, a fire is often lighted, kept from the ground itself by intervening wood logs, or the seed-bed is thoroughly steamed. After this treatment the upper 2 or 3 in. of soil are well pulverized, and fertilizers added, usually, to prevent reintroduction of seeds of weeds, in the form of guano or chemical manures. The seed is now set; usually it is thoroughly mixed with a relatively large quantity of fine ashes, sand or meal, to facilitate thin and even sowing, and the surface of the bed is afterwards lightly brushed over with a broom; it is very important to avoid burying the seed at all deeply; a light covering of cloth or muslin, raised on short sticks, is often stretched over the bed. Great care is necessary in attending to the watering of the young and delicate seedlings, which are ready for transplanting in from fifty to sixty days after sowing. They must be well hardened off before being set out in the open.

The land for their reception must be thoroughly well tilled and manured. If moist, ridges are formed about 3 to 4 ft. apart ; the dis­tance apart in the rows varies greatly with various types of tobacco: 3 ft. is the normal for ordinary manufacturing and smoking tobaccos, I to 1½ ft. for Cuba and Sumatra types. Cigar tobaccos become coarse if planted too widely. An acre of tobacco planted 3 ft. by 15 in. will contain 11,600 plants and 3 ft. 6 in. by 15 in., 10,000 plants. During the transplanting, preferably done on cloudy days or during light rains, the plants must be handled very carefully; machines are now available which can set out and water plants over from two to six acres in a working day.

After transplanting the crop takes about another sixty days to mature, *i.e.* about 120 days in all from the date the seed was sown. During this period, until the plants begin to ripen, the tilth is maintained and weeds checked first by horse cultivators or horse­hoes, and, as the plants increase in size, by hand labour. When the plants show signs of. flowering they are "topped ” to prevent seed formation, the terminal buds being removed, and only a certain number of leaves left on each plant to ripen. This operation requires experienced judgment to decide when it should be. done; the number of leaves to be left varies with the variety and vigour of the plant, the nature of the soil, climate, seasons and particular use for which the crop is intended. The product from plants which have not been topped is of little value. In the U.S.A., in the cigar tobacco district, fifteen to twenty leaves are often left on each plant, and of manu­facturing tobaccos only ten to twelve leaves. As one result of the topping, suckers are usually formed; these also must be removed, although, *e.g.* in Florida, vigorous suckers arc sometimes allowed to remain when the plant is cut, and produce a "sucker crop ” inferior in character to the first or principal crop, but still serviceable.

The leaves now ripen, indicated by a change from a dark to lighter green, and by the appearance of yellow spots. Ripening is com­plete in about 35 days after topping or about 155 days after sowing. A ripe leaf easily cracks or shows a crease when folded between the fingers. The leaves on a plant decrease in age from below upwards, and all are not ripe at exactly the same time. In high quality tobaccos the leaves are "primed" or picked singly as they ripen, but in the great bulk of American tobaccos the whole plant is cut close to the ground when the middle leaves are about ripe. In either case leaves should not be gathered when wet with dew or rain, or in very hot sunshine; the afternoon is usually the best time. The next step is to remove the harvested crop to the drying-shed; primed leaves are placed at once in shallow baskets or boxes, and when under cover are strung on string or on wire and hung up on laths in the barn. Cut plants are allowed to wilt, or become flaccid, before removal from the field, to prevent injury to the turgid leaves. These cut plants may be laid in rows on the ground to wilt, or spitted on long rods or laths supported on trestles, or placed on special drying racks. When sufficiently wilted they are hauled to the barn and hung up there on the same laths on which they were placed in the field.

A very interesting development of quite recent years is that of growing some valuable cigar tobaccos under artificial shade. Sumatra produced the best cigar wrappers of the world, and efforts to cultivate Sumatra tobacco in Florida under apparently suitable conditions of climate and soil were not successful. It was noticed, however, that if the tobacco was grown under the shade of trees the character of the leaf was improved. Artificial shading, first by laths, and later by cheese­cloth, both supported on posts, was then resorted to with eminently satisfactory results. The U.S.A. Department of Agriculture, in co-operation with local growers, devoted a great deal of attention and money to the problem, and Sumatra tobacco of very high quality is now produced in Florida and Connecticut. The yield of leaf is often much increased, the plants arc protected from the weather, and the enhanced value of the crop much more than repays the very considerable expense involved in artificially shading whole fields. So successful have the results been that American-grown tobacco of the Sumatra type is now exported even to Cuba.

Important changes take place in the tobacco leaf from the time it is cut until the finished product is ready for consumption. These may be all placed under curing, but it is usual to recognize three stages: (1) curing proper; (2) fer­mentation; and (3) ageing.

. Sun curing, now but little practised in the United States, is the simplest method. The wilted tobacco is suspended on racks in the sun. Great care is necessary to protect it from rain, and it must if necessary be placed in a barn in which fires may be required during wet weather. This method is employed in a portion of Virginia and results in a very sweet chewing tobacco.

Air curing is essentially similar to sun curing. The tobacco is hung in a barn in which there is a free circulation of air during dry weather. Artificial heat may be resorted to in bad weather; in the States, cigar tobaccos and "White Burley" are usually cured in this way. The process takes about six weeks.

In fire curing the tobacco is hung in the barn, and, after it has become of a rich yellow colour, slow fires, producing a gradual increase in temperature up to about 150° F., arc lighted on the floor and maintained for four or five days. The firing must be repeated at intervals as the leaves become soft again. A considerable portion of the tobacco exported to England and Africa is fire-cured.

In flue curing, also known as the Virginian cure, fires arc set outside the barn, and the heat led in iron pipes or flues, into the building arc under the suspended tobacco, which is placed there quite fresh from the field. The temperature is raised, during three to five days, from about 90° F. to 140° F. for primed leaves, or 160° to 175° F. for tobacco on the stalk. The process, which requires great judg­ment and care, results in the bright yellow leaf so largely used for pipe tobacco, cigarettes and chewing tobacco. In a modification of this method, known as the Kentucky cure, large barns are used, the temperature is not raised above 100°F., and the process occupies from four to. six weeks. By whichever way treated, the tobacco-leaf after curing is brittle and cannot be handled without crumbling to powder. The contents of the barn are therefore left till moist weather occurs, and then by the admission of atmospheric air the leaf blades absorb moisture and become soft and pliant. In this condition the leaves are stripped from the stems and sorted into qualities, such as "lugs," or lower leaves, "firsts ” and “ seconds. ” These are made up into “ hands, ” or small bundles of from six to twelve leaves. Each bundle is tied round with a separate leaf, and in this condition the tobacco is ready for bulking for fermentation.

The tobacco, whether in bundles, hands or separate leaves, is piled up or bulked on the floor in a barn into a solid stack to the height of 5 or 6 ft. Within this stack a process of fermentation is quickly set up, and the temperature of the mass rises steadily till it reaches about 130° F.

Great care is now taken to prevent overheating and to secure the uniform fermentation of all the tobacco. The pile is from time to time taken down and rebuilt, the tobacco from the top going to the bottom and that exposed at the edges being turned in to the centre. In from three to five weeks the fermentation should be sufficiently carried out, and the leaves then have a nice uniform brown colour. Dark-coloured leaves are produced when the temperature is allowed to. mount higher than when light leaves are required. Fermentation is essentially a chemical process due apparently to the presence of enzymes, developed in the leaf during the earlier curing stages. The view has been put forward that fermentation is due to the activity of bacteria, distinct types occurring in various tobaccos, but the balance of evidence is against it. On the bacterial theory it was thought possible to inoculate a poor tobacco with, say, the special bacteria present in Cuban tobacco, and so give the product the aroma and other good qualities of the more valuable tobacco. When fermentation is completed the tobacco is graded, an operation carried out very carefully in the case of the better cigar tobaccos, and packed for export, cigar tobaccos in bales, and other kinds in hogsheads. It is then kept at a moderate and fairly uniform temperature in a warehouse, when, although there is no marked outward change, the tobacco becomes more mellow. Two years are usually required for ageing, but some tobaccos are kept for four or five years before being manufactured.

An artificial aroma is sometimes given to tobaccos, especially for the “ fillers ” of cigars, by saucing or treating the leaves with a solution containing an infusion of fine quality tobacco stems, rum, sour wine and various flavouring materials such as oil of aniseed, tincture of valerian, powdered cloves, cinnamon and liquorice.

*Pests and Diseases.*—Tobacco, like other cultivated plants, is subject to attack by various pests and diseases, but fortunately these are less destructive than with many crops. On the other hand, comparatively trivial incidents do more harm to a relatively delicate plant like the tobacco than to more robust plants.

The “tobacco flea-beetle" *(Epitrix parvula,* Fabr.) is a small active beetle, the larvae of which attack the roots, while the adult beetles eat holes in the leaves. The latter is the more serious, as in addition to the actual damage done by the beetle the holes afford entrance to fungus spores, &c. Under the name "horn worms" are included the larvae or caterpillars of species of *Protoparce.* These compara­tively large and voracious animals, when abundant, do great damage by eating the leaves. Other caterpillars, "budworms” *(Heliothis,* spp.),