perature is very marked. The downward percolation of warm or cold rain from the surface to the 4-in. depth causes rapid changes in temperature, especially in sandy soils, when percolation is rapid. After drainage has ceased a rise in temperature may enable it to begin again, owing to the diminishing viscosity of water with increasing temperature. The formation of a dry surface-mulch reduces the value of $\left(\frac{R_4}{R_0}\right)$ owing to the low conductivity of dry soil. But the actual *temperature* at the 4-in. depth is not greatly reduced by the poor conductivity of the dry soil. This is attributed to the dry surface layers reaching a higher temperature owing to their lessened specific heat, and this counteracts the effect of decreased conductivity. It is shown that a strong dry wind causes the temperature of the surface soil to fall considerably below that of the air. The effect of frost is examined and a formula given for depth of soil frozen in terms of mean surface temperature and duration of frost. A very close relation holds between the date of flowering of coltsfoot and the number of frosts for the two months previous to the date of flowering on open soil not covered with deep snow. It is shown also that strong warm west winds—associated with cyclonic depressions—rapidly raise the temperature of the underground layers of soil in spring. B. A. K.

Control of Insect Pests.

ENGLISH tomato-growers in the Lea Valley are threatened with an annual loss of from 5*l*.–10*l*. per acre unless special remedial measures are adopted against the glasshouse tomato moth, *Polia* (*Hadena*) *oleracea*. L. Lloyd (Monthly Circular of the Lea Valley and District Nurserymen's and Growers' Association, Ltd.) finds that spraying with lead arsenate for the destruction of the pest must be supplemented by trapping the caterpillars and moths and by destruction of the pupæ. The caterpillars can be trapped in old sacks, and ultimately killed by boiling water, while the moths are attracted to wide-mouthed jars containing brown treacle and ale mixed with 1 per cent. of sodium fluoride. Emphasis is laid on the necessity for ascertaining that each control measure is effective.

Several papers have recently been published dealing with the control of various "borers" that infest crop trees. Attempts have been made to control the peach-borer by means of toxic gases derived from poisonous substances distributed on the soil round the base of the trees, E. B. Blakeslee (Bull. 796, U.S.A. Depart. Agric.) finds that the more usual toxic agents, viz. carbon bisulphide, carbon tetrachloride, sodium cyanide, and naphthalene, are all unsuitable for various reasons, but that para-dichlorobenzene offers distinct possibilities for the purpose. The surface crust about the collar of the tree is broken, the required dose of poison (about 1 oz. per tree from 6–15 years old) distributed evenly about the trunk in a band 1–2 in wide, and a covering of earth applied and moulded up. It is claimed that by this method 94 per cent. of the larvæ can be destroyed.

Much damage is wrought in the United States by the apple-tree borer, which usually takes two or three years to pass through its life-cycle. It is difficult to attack the larvæ by means of poisonous sprays, and mechanical devices are necessarily resorted to. F. S. Brooks (Farmers' Bull. 675, U.S.A. Depart. Agric.) maintains that the most effective method of control is the old-fashioned practice of "worming" with a knife and a piece of wire, but recommends the use of carbon bisulphide when the burrows are obstructed and the larvæ cannot be reached by the wire. Egg-laying can be prevented by a thick coat of paint applied to the bark of the tree, or by means of wrappings of cloth or newspapers applied close enough to exclude the adult female from the bark. The beetle can be killed by spraying the trees with arsenate of lead, as by this means their food is poisoned, but it is doubtful if this is profitable as a general rule.

A most comprehensive account of the toon shoot and fruit borer (*Hypsipyla robusta*, Moore) is given by C. F. C. Beeson in the *Indian Forest Records* (vol. vii., part vii.). The stages of the insect, its life-history and habits, and studies of its seasonal history are fully described, and from the information thus gained the best methods of control are elucidated. The toon borer passes through five generations in the year; the first is spent in the flower, the second in the developing fruits, and the last three in the young shoots of the current season. The effect of this habit is that the first and second broods cause great injury to the seed crop, and in bad years may hinder seed-formation entirely, whilst the three later broods may completely nullify the season's growth in young trees, and, in any case, they cause great delay in the development of the saplings. It is often of little use to make young plantations in the neighbourhood of old toon trees which are infested with the borer. The young trees are subject to attack from their second or third year onward, but may be somewhat protected by banding the trees breast-high with sacking, and removing and destroying at intervals all the larvæ and cocoons found inside the sack-bands. After the fruits are ripe it is advisable to cut out and burn all shoots that are attacked, and in bad cases a second pruning should be made during the cold weather.

Scientific and Systematic Pomology.[1]

IT may be taken as a sign of the development of research in fruit culture in this country, and of the interest which has been aroused in connection therewith among growers of fruit and progressive horticulturists generally, that the well-known firm of nurserymen, Messrs. George Bunyard and Co., Ltd., of Maidstone, has considered the time ripe for the issue of a new quarterly journal devoted exclusively to pomology. The editor, Mr. E. A. Bunyard, a member of the firm named, is recognised both as a practical grower of wide experience and as one of the foremost authorities on systematic pomology and pomological literature. Under his guidance the *Journal of Pomology* should without difficulty establish itself as a publication of scientific value, meeting the needs of a branch of horticulture which has advanced with rapid strides in its importance for the country economically and physiologically since the day when the late Mr. W. E. Gladstone advised farmers to grow fruit for jam production as a remedy for agricultural depression, and is at present none too well catered for in this respect.

The contents of the first two numbers may appear to suggest that there is scarcely occasion yet for a periodical intended primarily to serve for scientific and systematic pomology in this country, some of the more important articles being reprints or abridgments of papers previously published in other journals. Such articles, however, as those by Miss Sutton on self-sterility in plums, cherries, and apples, and by Brooks and Bailey on silver-leaf disease, are of a

[1] *The Journal of Pomology*. Edited by Edward A. Bunyard. Vol. i. Nos. 1 and 2. (Maidstone: Geo. Bunyard and Co., Ltd.) Published Quarterly. Single Nos. 3*s*. 6*d*.; Annual Subscription 10*s*.

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