inflorescences, after initiating a mean number of 11.0 leaves. This alone is in support of Hartmann's experimental results with the variety Missionary. No other runner plants produced inflorescences.

The purpose of this communication is to direct attention to the results given in Table 1 and Fig. 1. The presence of leaves on runner plants in continuous light was associated with delayed inflorescence initiation, increased stolon production and increased petiole length in the parent plants growing in short photoperiods. Moreover, the effect was proportional to the number of leaves retained on the runner plants. All these responses are characteristic of the effect of long photoperiods on the strawberry.

It is suggested that the runner plants acted as donors and the parent plants as receptors of a quantitatively active stimulus promoting vegetative as opposed to reproductive growth.

The experiment was designed as a preliminary study of the influence of leaves on the runner plant in long photoperiods upon the response of the runner plant to a flower-inducing stimulus received via the stolon from the parent plant. The control layout, while adequate for the original purpose, does not preclude an explanation in terms of nutritional factors. However, the appearance of the critical parent plants, which made vigorous growth, typical of short-day responses in the variety, suggests that formative rather than nutritional factors were operating.

Further work is in progress.

C. G. GUTTRIDGE
Scottish Horticultural Research Institute,
Mylnfield,
Invergowrie, Dundee.
Feb. 22.

¹ Guttridge, C. G., Ph.D. thesis, University of Reading (1953).

² Hartmann, H. T., *Plant Physiol.*, **22**, 407 (1947).

Seed Vernalization and Flowering in Lettuce (*Lactuca sativa*)

TEMPERATURE, photoperiod, and chemical regulators, separately and interacting, markedly influence seed-stalk development in lettuce¹. Conflicting reports have, however, appeared as to the effectiveness of seed vernalization in accelerating flowering in this crop². In order to resolve these differences, leaf number preceding the visible inflorescence has been used as a 'physiological index' of flowering³, and the effects of seed vernalization, in combination with temperature, day-length, and chemical regulators, have been evaluated.

A standard procedure was used for the vernalization of head lettuce seed (*Lactuca sativa*, variety Great Lakes), consisting of pre-germinating moist seed at 60–70° F. for 24–48 hr. and then subjecting to 40° F. for at least thirteen days. Periodical temperature interruptions of 60–90° F. for 2 hr. daily, or at three-day intervals, did not nullify the vernalizing effect of cold exposure. Seed which was pre-germinated for three days or more at 60° F. was not effectively vernalized by subsequent exposure to 40° F. Plants from lettuce seed which had been soaked at 60–70° F. and air-dried 6–12 hr. prior to chilling at 32° or 40° F. were delayed in flowering as compared with those vernalized according to the standard procedure. When maleic hydrazide (20 and 40 p.p.m.) was added to the water which was used in moistening the seed

during vernalization, plants afterwards produced visible flower parts at a lower node than did plants from seed vernalized in water alone. (The maleic hydrazide was formulated as the water-soluble diethanolamine salt of 1,2-dihydro-3,6-pyridazinedione and applied as 'MH-40' by the U.S. Rubber Company, Naugatuck Division, Naugatuck, Conn.)

When lettuce plants were grown at night temperatures above 65° F. subsequent to seed vernalization, seed-stalk development was accelerated without preceding head formation. At temperatures below 65° F., plants grown from vernalized seed first produced a high percentage of firm, vegetative heads and then flowered. Non-vernalized plants flowered only at night temperatures above 65° F. The potential for flowering was decidedly greater following seed vernalization, but flowering was afterwards delayed by continuous night temperatures below 65° F. and was completely absent at 50° F. Much of the disparity in results obtained with seed vernalization of lettuce by various workers may be resolved on this basis.

Soil temperatures influenced the rate of seed-stalk development (days to anthesis), but not the vernalization stimulus *per se* (leaf numbers preceding the inflorescence). At the higher soil temperatures (64° and 70° F.) flowering was promoted, whereas at lower temperatures (50° and 57° F.) flowering was delayed. A decrease in the percentage of plants which produced seed-stalks occurred as soil temperatures declined from 71° to 50° F.

Likewise, photoperiod markedly affected flowering of vernalized head lettuce. The minimum night temperature following vernalization which favoured earlier flowering was reduced from 65° to 60° F. when plants were grown at a day-length of 16 hr. At 60° F. with a nine-hour day, both vernalized and non-vernalized plants formed firm vegetative heads which flowered simultaneously. Thus the flower-promoting effects of seed vernalization in lettuce may be nullified by short photoperiods as well as cool growing temperatures.

The delaying effect of cool (below 65° C.) temperatures (both soil and air) combined with relatively short days on seed-stalk development in greenhouse studies was verified in the field. Plants grown in the early spring, when night temperatures were less than 60° F., formed heads and remained vegetative irrespective of prior seed vernalization or treatment with chemical growth regulators.

This communication is based on a thesis submitted by one of us (L. R.) in partial fulfilment of the requirements for the Ph.D., Michigan State University.

LAWRENCE RAPPAPORT
S. H. WITTWER
H. B. TUKEY

Department of Horticulture,
Michigan State University,
East Lansing.
Feb. 6.

¹ Andrew, W. T., Ph.D. thesis, Michigan State College (1953). Franklin, D. F., *Proc. Amer. Soc. Hort. Sci.*, **51**, 453 (1948). Rappaport, L., and Wittwer, S. H., *Abs. Amer. Soc. Hort. Sci.*, East Lansing, Mich., Sept. 5–8 (1955). Thompson, H. C., and Knott, J. E., *Proc. Amer. Soc. Hort. Sci.*, **30**, 507 (1933).

² Gray, S. G., *Aust. Counc. Sci. and Ind.*, **15**, 211 (1942). Knott, J. E., Terry, O. W., and Andersen, E. M., *Proc. Amer. Soc. Hort. Sci.*, **35**, 644 (1937). Thompson, R. C., and Kosar, W., *Proc. Amer. Soc. Hort. Sci.*, **52**, 441 (1948). Warne, L. G. G., *Nature*, **159**, 31 (1947).

³ Purvis, O. N., *Ann. Bot.*, **48**, 919 (1934). Wittwer, S. H., and Teubner, F. G., *Proc. Amer. Soc. Hort. Sci.* (in the press).