TOMATOES, BERRIES AND OTHER CROPS UNDER CONTINUOUS LIGHT IN ALASKA

HAVING read of strawberry production in central Alaska under six weeks' continuous daylight in summers, and having seen illustrations in the Alaskan stations' reports of the remarkably vigorous growth of strawberries, the writer became interested in making tests of their growth under continuous artificial light (500 watts) and under a combination of artificial light at night and of daylight for the day periods. After five months (November 11 to April 9) the plants of the several species and varieties used had made a somewhat spindling growth under the continuous artificial light and were not as vigorous as those under the 24-hour combination of artificial light and normal daylight. However, the test did show that it was possible to grow strawberries under continuous artificial light, and with improvement in the intensity and other environmental conditions even more satisfactory growth could be expected.

Reports of experimental results in growing tomatoes under artificial illumination have indicated that they reached maximum development with the 12-hour daily light exposure, and were injured by daily light exposures of 17 or more hours.[1] A recent paper[2] reports that where light of the same composition as sunlight is reduced to 35 per cent. of full sunlight, tomatoes did best. This would indicate an illumination of 3,500-foot candles as optimum for tomatoes. Continuous illumination, using as low as 150-foot candles, injured tomato plants, but when half sunlight and half artificial light were used the rate of injury was greatly decreased.

Though these reports have simply meant to the writer that the laboratory conditions were not the same as out-of-door conditions, recent conversations with others have indicated that many have assumed that tomatoes would not grow vigorously under long days, under continuous light or under full sunlight. However, in the report of the Alaska Agricultural Experiment Stations for 1915 there is a photograph of remarkably vigorous plants growing out-of-doors at Fairbanks, Alaska (64°–0′), less than 2 degrees from the Arctic Circle, and the statement occurs (page 51):

> Twenty tomato plants were set in the open garden early in June. These plants bore from 6 to 10 pounds to the vine, and about 30 pounds ripened thoroughly on the vines.

In the report for 1916 a picture (p. 33) is shown of plants set June 1 out-of-doors at Rampart, Alaska (lat. 65°–30′), which produced ripe fruit August 1. In the report of the Agricultural Experiment Station for 1918 there is a photograph of Bonny Best tomatoes grown at Rampart, Alaska (lat. 65°–30′), and the statement is made (p. 50) that:

> In the greenhouse the plants bore remarkably well, producing many large handsome clusters, Bonny Best leading in this respect. The early part of the summer was too cold, however, for tomatoes to do well out-of-doors. Though most of the blossoms blighted, there was still considerable fruit, some of which ripened.

Other reports of the Alaska Stations both earlier and later contain other references to tomatoes in central Alaska where there is continuous daylight for about six weeks in midsummer from about the time the plants are set in the field until they have produced a heavy crop of fruit.

Director G. W. Gasser, of the Experiment Station at Fairbanks, has kindly sent me the figures on sunlight for that station. Fairbanks, Alaska, has 1,266.7 hours of sunlight out of a total of 1,464 hours during June and July (as compared with 900 hours of sunshine at Washington, D. C., for the same months). This leaves an average of about 3.2 hours per day for June and July at Fairbanks without sunlight, most of the 3.2 hours, however, being lighted and effective for plant growth.

Though the studies of Allard and of many others on the effects of the length of the daily light periods on plants have given us results of immeasurable and of immediate practical value, there is danger of drawing hasty generalizations concerning the effect of sunlight from the effects of artificial light under laboratory conditions.

Those making light studies with crop plants will be interested in the wealth of information in the Alaskan stations' reports on the response of many different vegetables, flowers and field crops in regions of extremely long days and of continuous light.

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[1] N. E. Pfeiffer, "Microchemical and Morphological Studies of Effect of Light on Plants." *Bot. Gaz.*, 81: 173–195, 1926.

[2] J. M. Arthur, *Torreya*, 32: 107–108, 1932.

BOOKS RECEIVED

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