

ABSTRACT OF THE THESIS

Field Phenology and Germination

Stellaria media (L.) Cyrill.

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Observations were begun in fall, 1970, and continued at 7- to 14-day intervals until February 28, 1972, on Stellaria media (L.) Cyrill. (Caryophyllaceae) growing at the north edge of Hutcheson Memorial Forest (HMF) in New Jersey (designated FEN). Periods of vegetative growth and flowering were recorded, open flowers marked, and mature seeds collected. Measurements were made of soil temperature, maximum-minimum air temperatures, and soil moisture. Precipitation data were obtained from the HMF weather station. Seeds collected throughout the study period were tested for germination in a 10-20 C, 8L:16D regime for viability with tetrazolium. To make preliminary observations on whether flowering time, seed production, and/or seed viability were significantly affected by forest-edge versus open-field locations at HMF, two transplants were made from a nearby garden--one to the open field (OFT) and one to the north edge of the forest (FET).

Stellaria media grew continuously at FEN throughout the study period. FET vegetative growth stopped in mid-July and that of OFT stopped in late June. Death of OFT plants appeared to be a result of the high air and soil temperatures from May to August. Open flowers were observed at FEN from early April until late August and again in mid-October, although peak flowering occurred in May. Buds (and/or closed flowers) were observed at FEN from late October until mid-January. Open flowers

and/or buds were seen at FET from April to mid-June and at OFT from April to mid-May. Stellaria media remaining in the garden from which FET and OFT were obtained flowered throughout the study except for June, July and August. These observations indicate flowering of S. media is not controlled solely by photoperiod. Stellaria media was also observed to function as a perennial; that is, new shoots were developed vegetatively in some cases from parent plants.

Competition with other plants appeared to affect where S. media occurred. Thus, S. media growth was favored in plowed areas temporarily devoid of other vegetation and by its association with Rubus occidentalis L. at FEN.

Peak seed collections occurred in May and June for FEN, FET and OFT, although a larger total number of seeds was collected at FEN. There was more than one seed-collection date for most dates that flowers were marked, indicating open flowers marked on a particular day were not all the same age and perhaps that not all seeds ripened at the same rate. The mean percentage germination of four to five week old FEN seeds given a one-week prechill was 87.3 (95.7 when August and September collections are deleted from this figure), FET = 68.3, and OFT = 49.4. Percentage viability for these FEN seeds was 96.8, FET = 83.7, and OFT = 94.5. Six-month old seeds tested as above gave generally very high germination and viability percentages. Those given the one-week prechill generally germinated at a faster rate than those not given the prechill.

Germination percentages ranged from 9.2 to 64.3 for seeds tested at 4 C in constant dark for 30 days, while those tested at 4 C using a light regime of 8L:16D ranged from 43.3 to 74.4. In seeds tested at

4 C, no germination occurred until after 15 days.

This study and others indicate S. media seeds can germinate well under several different combinations of light and temperature, exhibiting a high degree of physiological heterogeneity.