



Reproductive Phenologies of Selected Flowering Plants in Eastern Maine Forests

R.W. Hansen
S.B. Hansen
and
E.A. Osgood

Technical Bulletin 143



January 1991

MAINE AGRICULTURAL EXPERIMENT STATION

Reproductive Phenologies of Selected Flowering Plants in Eastern Maine Forests

R.W. Hansen¹
S.B. Hansen²
and
E.A. Osgood

Department of Entomology
University of Maine
Orono Maine 04469

¹Present address: USDA-APHIS, Otis Methods Development Center, Otis ANGB, MA 02542

²Present address: 200A Palmer Ave, Falmouth, MA 02540

ACKNOWLEDGEMENTS

This work was funded by the Maine Department of Conservation, Forest Service, and federal McIntire-Stennis appropriations.

INTRODUCTION

We examined the impact of carbaryl (Sevin-4-oil[®]) on native pollinating insects and insect-pollinated plants as part of a general effort to identify nontarget effects of aerially applied spruce budworm insecticides (Hansen and Osgood 1983, 1984). These studies showed that carbaryl reduced pollinating insect populations and fruit production by several entomophilous plants. In general, entomophilous plants most susceptible to insecticide-related pollinator mortality are those that flower shortly after insecticide applications, when the most serious reductions in pollinator populations occur (Thaler and Plowright 1980). Because different plants flower at different times of the year, species potentially at risk change with insecticide application dates.

Experiments testing the impact of aerially applied insecticides or other perturbations on plant reproduction require advance knowledge of the initiation and duration of flowering. Heinrich (1976) monitored flowering, but not fruiting, phenologies in several habitats in central Maine. Ripe fruits serve as a food resource for forest vertebrates, and their seasonal occurrence is of interest to wildlife researchers. Thus, we documented both flowering and fruiting patterns during the spring and summer of 1982 of plant species found in eastern Maine forests.

METHODS

Two study areas, separated by ca. 16 km, were selected in northern Hancock County (Twp. 34 M.D. and 3 N.D.) to examine insecticide-related pollinator mortality and reductions in fruit production (Hansen and Osgood 1983). Forest cover at these sites consisted primarily of second-growth red spruce (*Picea rubens* Sarg.) and balsam fir (*Abies balsamea* (L.) Mill.). Additional canopy species included eastern hemlock (*Tsuga canadensis* (L.) Carr.), eastern white pine (*Pinus strobus* L.), black spruce (*Picea mariana* (Mill.) B.S.P.), and several northern hardwood species. Other habitats included bogs and other wet areas, and open areas typically associated with logging and other human activities.

Flowering and fruit development were monitored for many of the plant species found in the study areas and in their immediate vicinity.

From mid-May to mid-August 1982, we visited the sites about twice a week. Each plant species was recorded as possessing flower buds, flowers, immature fruits, ripe fruits, or dispersed fruits. The

relative progression of flower and fruit development was subjectively ranked on a scale of one (least developed) to three (most developed). Flowering and fruiting events, and their relative development, were described on a composite, landscape basis for each species and not based on repeated observations of individual plants. The relative abundance and habitat was generally noted for each plant species. Gleason and Cronquist (1963) served as the reference for plant nomenclature.

RESULTS

Table 1 lists 57 forest plant genera or species examined during this study. Their reproduction phenologies are illustrated in a general chronological order (Fig. 1). For each listing, the vertical dimension of the bar refers to relative development on a one (bottom) to three (top) scale. Some species could not be located during certain site visits, and thus, their reproductive status could not be determined. These are designated by an ND (no data").

This information should provide a useful chronology of flowering and fruiting phenology in this area. Although the initiation of various reproductive events will vary from year to year, the temporal sequence of a species' flowering and fruiting should remain generally constant. Relationships among species should also exhibit general year-to-year consistency, so that early flowering species may serve as predictors for later species.

LITERATURE CITED

- Gleason, H.A., and A. Cronquist. 1963. *Manual of vascular plants of northeastern United States and adjacent Canada*. New York: D. Van Nostrand Co., 810 pp.
- Hansen, R.W., and E.A. Osgood. 1983. Differential effects of temperature, when spraying with Sevin-4-oil^R, on pollinators and fruit set in a spruce-fir forest, 19–58. In *Environmental monitoring reports*, 1982 Maine Cooperative Spruce Budworm Suppression Project. Augusta: Maine Dept. of Conservation, 128 p.
- Hansen, R.W., and E.A. Osgood. 1984. Effects of a split application of Sevin-4-oil^R on pollinators and fruit set in a spruce-fir forest. *Can. Entomol.* 116:457–464.
- Heinrich, B. 1976. Flowering phenologies: bog, woodland, and disturbed habitats. *Ecology* 57:890–899.
- Thaler, G.R., and R.C. Plowright. 1980. The effect of aerial insecticide spraying for spruce budworm control on the fecundity of entomophilous plants. *Can. J. Bot.* 58:2022–2027.

Table 1. List of plant families

Family	Species
Apocynaceae	<i>Apocynum</i> spp.
Araliaceae	<i>Aralia hispida</i> Vent. <i>A. nudicaulis</i> L.
Caprifoliaceae	<i>Diervilla lonicera</i> Mill. <i>Linnaea borealis</i> L. <i>Lonicera canadensis</i> Marsh. <i>Sambucus canadensis</i> L. <i>S. pubens</i> Michx. <i>Viburnum alnifolium</i> Marsh.
Compositae	<i>Achillea millifolium</i> L. <i>Anaphalis margaritacea</i> (L.) Benth. & Hook. <i>Aster acuminatus</i> Michx. <i>Aster</i> spp. <i>Chrysanthemum leucanthemum</i> L. <i>Hieracium</i> spp. <i>Solidago</i> spp. <i>Taraxacum officinale</i> Weber
Cornaceae	<i>Cornus canadensis</i> L.
Cruciferae	<i>Barbarea vulgaris</i> R.Br.
Cyperaceae	<i>Carex pensylvanicum</i> Lam.
Ericaceae	<i>Chamaedaphne calyculata</i> (L.) <i>Epigaea repens</i> L. <i>Gaultheria procumbens</i> L. <i>Gaylussaccia baccata</i> L. <i>Kalmia angustifolia</i> L. <i>Ledum groenlandica</i> Oeder <i>Pyrola elliptica</i> Nutt. <i>Rhododendron canadense</i> (L.) B.S.P. <i>Vaccinium</i> spp.
Fabaceae	<i>Trifolium</i> spp.
Hypericaceae	<i>Hypericum</i> spp.
Iridaceae	<i>Sisyrinchium</i> sp.
Labiatae	<i>Prunella vulgaris</i> L.

Table 1. Continued.

Family	Species
Liliaceae	<i>Clintonia borealis</i> (Ait.) Raf. <i>Maianthemum canadense</i> Desf. <i>Medeola virginiana</i> L. <i>Streptopus roseus</i> Michx. <i>Trillium undulatum</i> Willd.
Onagraceae	<i>Epilobium angustifolium</i> L.
Oxalidaceae	<i>Oxalis acetosella</i> L.
Polygonaceae	<i>Polygonum scandens</i> L.
Primulaceae	<i>Trientalis borealis</i> Raf.
Ranunculaceae	<i>Coptis trifolia</i> var. <i>groenlandica</i> (Oeder) Fassett <i>Ranunculus acris</i> L.
Rosaceae	<i>Amelanchier</i> spp. <i>Dalibarda repens</i> L. <i>Fragaria virginiana</i> Duchesne <i>Potentilla</i> spp. <i>Prunus pennsylvanica</i> L.f. <i>Rubus strigosus</i> Michx. <i>Rubus</i> spp. <i>Spiraea</i> spp.
Salicaceae	<i>Salix</i> spp.
Scrophulariaceae	<i>Veronica officinalis</i> L.
Violaceae	<i>Viola</i> spp.

Figure 1. Reproductive phenologies of plant species, Hancock Co., Maine, 1982

<u>KEY</u>	
Reproductive Status	 FLOWER BUDS  FLOWERS  IMMATURE FRUITS  RIPE FRUITS  DISPERSED FRUITS ND NO DATA
Abundance	C COMMON L LOCALLY COMMON S RARE
Habitat	O OPEN AREAS W WOODED AREAS E FOREST EDGES B BOGS, WET AREAS

SHRUB SPECIES

Salix spp.
(Willows)

Abundance

Habitat

MAY

JUNE

JULY

AUG.

21 28

7 14 21 28

7 14 21 28

7 14 21 28

7 14

C

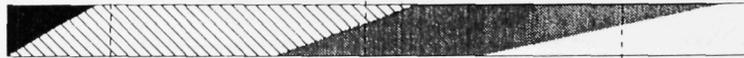
E



Lonicera canadensis
(Fly honeysuckle)

S

W



Amelanchier spp.
(Serviceberries)

L

E



Viburnum alnifolium
(Hobblebush)

S

W



Chamaedaphne calyculata (Leatherleaf)

L

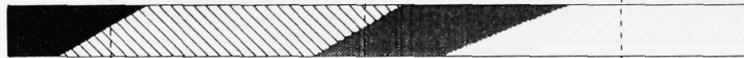
B



Rubus spp.
(Creeping blackberry)

C

OE



Prunus pensylvanica
(Pin cherry)

C

OE



Rhododendron canadense (Rhodora)

L

BE

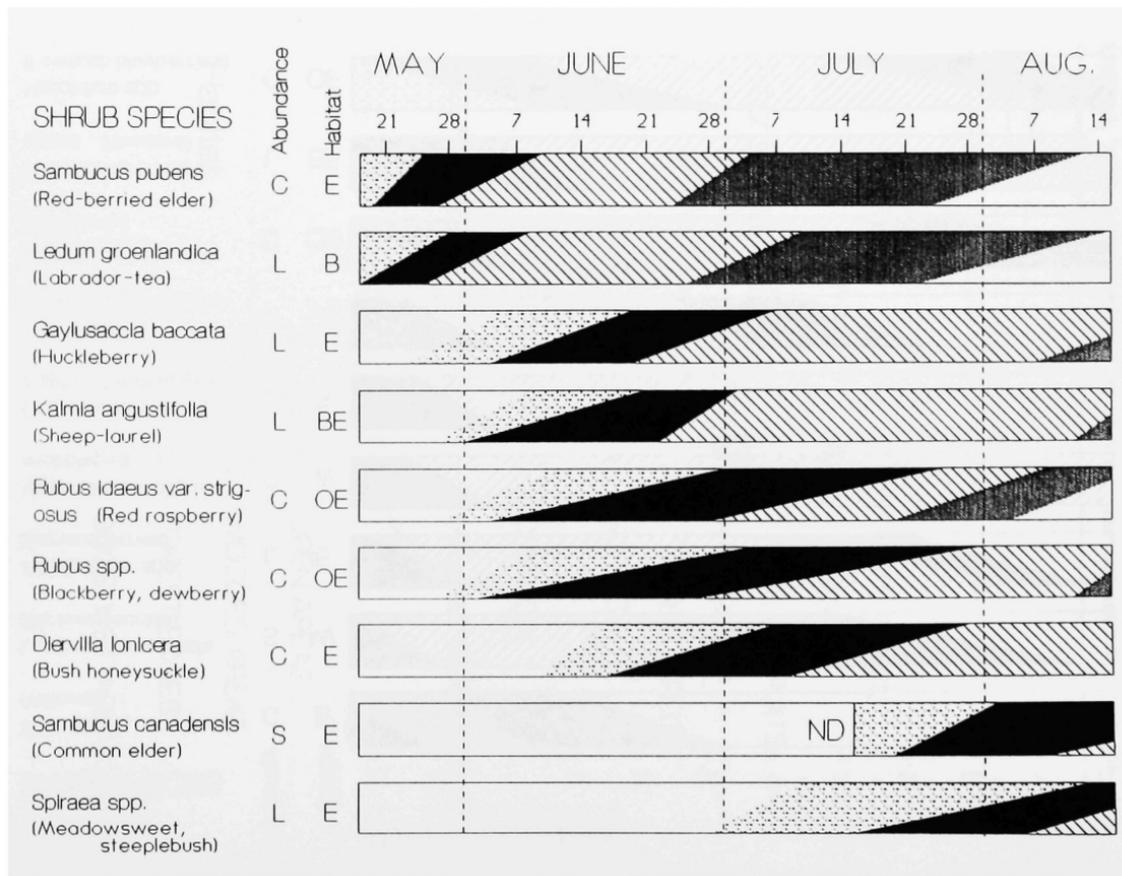


Vaccinium spp.
(Lowbush blueberries)

C

OE





HERB SPECIES

Epigaea repens
(Trailing arbutus)

Carex pensylvanicum
(Wood sedge)

Taraxacum officinale
(Dandelion)

Viola spp.
(Violets)

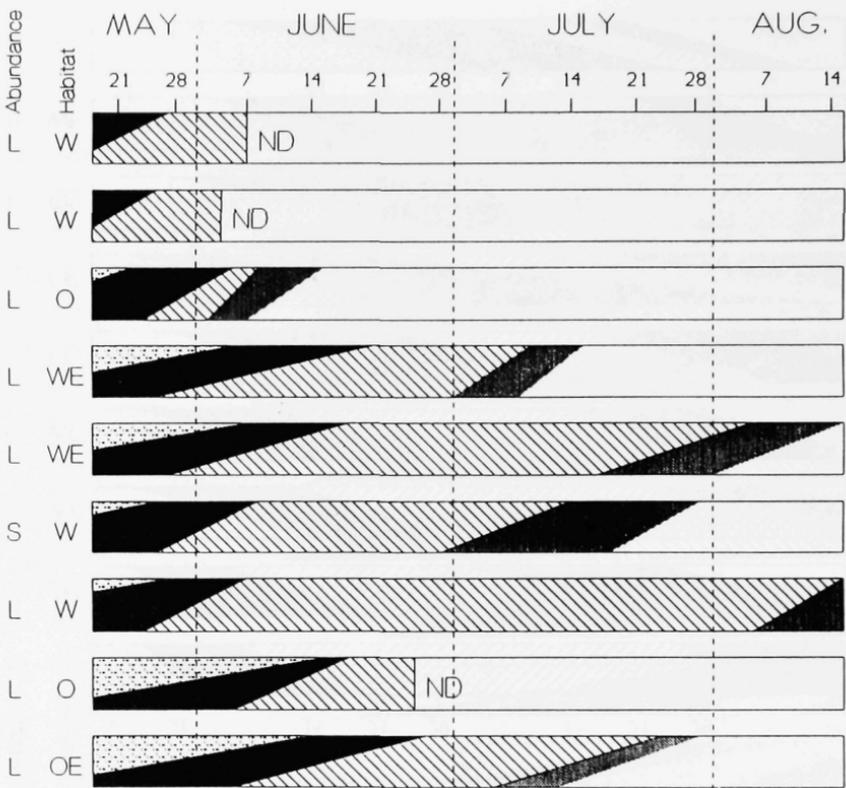
Coptis trifolia var. *groenlandica*
(Goldthread)

Streptopus roseus
(Twisted-stalk)

Trillium undulatum
(Painted trillium)

Barbarea vulgaris
(Yellow rocket)

Fragaria virginiana
(Wild strawberry)



HERB SPECIES

Trientalis borealis
(Star-flower)

Clintonia borealis
(Bluebead-lily)

Malanthemum cana-
dense (Mayflower)

Cornus canadensis
(Bunchberry)

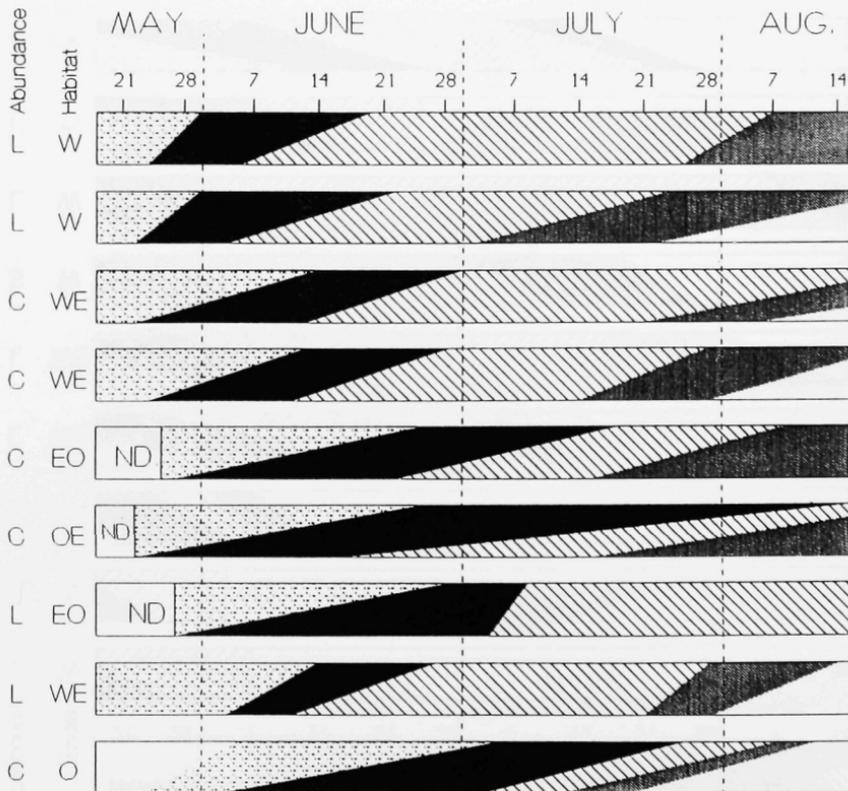
Ranunculus acris
(Tall buttercup)

Potentilla spp.
(Cinquefoils)

Sisyrinchium spp.
(Blue-eyed grass)

Aralla nudicaulis
(Wild sarsaparilla)

Hieracium spp.
(Hawkweeds)



HERB SPECIES

Oxalis montana
(Wood sorrel)

Linnaea borealis
(Twinflower)

Chrysanthemum leucanthemum
(Oxeye daisy)

Achillea millefolium
(Yarrow)

Trifolium spp.
(Clovers)

Veronica officinalis
(Common speedwell)

Prunella vulgaris
(Selfheal)

Epilobium angustifolium
(Fireweed)

Aralla hispida
(Bristly sarsaparilla)

