Laboratory studies have shown that spores of *A. ruta-muraria* imbibed at 15°C for periods as long as 42 days rapidly germinate when transferred to 25°C. After 12 days, 95% had germinated. This is a higher percentage than for spores imbibed at 25°C, suggesting that fluctuating temperatures may stimulate germination.

The restriction locally of *A. ruta-muraria* to warmer crevices, and the apparent stimulation of germination by temperature cycling, may be responsible for both the similarities of the geographical distribution of the two species despite dissimilar temperature requirements, and for the observed differences in local distribution. However, until further studies on the effects of temperature and the effects of other factors which tend to be correlated with temperature, such as relative humidity, are carried out, these conclusions can only be tentative.

Jalas, J. and Suominen, J. 1972. *Atlas Flora Europea I. Pteridophyta* (*Psilotaceae to Azollaceae*). Helsinki: Committee for Mapping the Flora of Europe.

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C. REPRODUCTION AND PROPAGATION

Preliminary studies on the breeding systems of *Dryopteris filix-mas* (L.) Schott and *D. dilatata* (Hoffm) A. Gray

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Dense cultures of *Dryopteris filix-mas* and *D. dilatata* were grown on mineral agar at 20°C under continuous illumination. Cultures were sown either with spores from individual plants or with spores of two plants from either the same or different populations of the same species. In all cases, two types of fertile gametophytes were observed in *D. filix-mas*. These were: (i) large, cordate and female, and (ii) small, spatulate and male. At a later stage, many female gametophytes became hermaphrodite. *D. dilatata* produced only one fertile type. These were cordate and female and also became hermaphrodite later. From these findings, it is proposed that *D. filix-mas* has a bigametophytic system in which separate male and female gametophytes co-exist, at least for a while. In contrast, *D. dilatata* shows a monogametophytic system with only female gametophytes initially. Spores of each species were sown on normal medium and on medium containing previously used agar. On normal agar, results for both species were as above, but on the previously

used agar, *D. filix-mas* produced all spatulate male gametophytes while *D. dilatata* again produced cordate female gametophytes. It is suggested that because of these gametangial patterns, both species are outbreeding but in *D. filix-mas* there exists also an antheridiogen system.

Potential of the ostrich fern (*Matteuccia struthiopteris* (L.) Todaro) as a crop plant

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Croziers of the ostrich fern (locally known as the fiddlehead fern) have been traditionally harvested in the spring as a green vegetable from wild stands. In co-operation with other workers in the Canadian maritime provinces, we are conducting experiments to test the feasibility of cultivating this fern as an agricultural crop plant.

Our studies involve the following approaches:

1. Propagation of sporophyte plants *in vivo* and *in vitro*, both sexually, from spores, and, asexually, from rhizome segments. Asexual propagation to produce large numbers of clonal plants for the field is important if high-yielding clones are required for cropping: buds grown from 'detached meristems' on rhizomes can be cultured *in vitro* and *in vivo* to produce clonal plants.

2. Growth of propagules in controlled environments for studies of growth and development. Maximum linear growth of rhizomes occurs in July. Rhizomes initiate significantly more apical crown formation and secondary rhizomes in response to short (8 h) as compared with long (16 h) daily photoperiods; there are also differences in sporophyll formation according to daily photoperiod, and in growth of tropophylls from croziers according to temperature—suggesting the importance of seasonal changes in daylength and temperature for the partition of various developmental processes according to season.

3. Rhizome segments lacking bud formation, 3-year-old sporophyte plants grown from spores or rhizomes, and mature crowns have been planted and assessed in plots and row plantings. The most satisfactory establishment and subsequent colonisation by rhizome formation in the years following planting has been obtained from the 3-year-old sporophyte plants that were hilled (ridged) after their initial establishment. Light-tolerant clones have been isolated and may outproduce other less tolerant clones during their establishment period.

Yield comparisons have been based primarily on: the number and weight of croziers elongating from the total number present within the crown, the plant density attained, and the yield of croziers that can be sustained with different harvesting pressures. We conclude that there is considerable potential for selection of high-yielding clones that can provide a sustainable yield of croziers from year to year.