THE INFLUENCE OF MALE STERILITY ON OUTCROSSING IN PEAS

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Because the pea has a cletstogaraous flower, the frequency of outcrossing is low in most northern environments (1, 3). Thus, methods of enhancing hybridization may be of interest to the breeder. We obtained several pea lines segregating for male sterility and have characterized them genetically and cytologically (2). Working in the field with F2 segregates of marker line-male sterile crosses, we observed pod set on ms plants (Table 1). The percentage of ms plants with at least one pod varied considerably among ms genes. Crosses between different marker lines to the same male sterile exhibited similar pod set behavior. However, plant height affected the amount of pod set with short plants (le le) showing a lower percentage pod set than tall plants (Le/-). Short plants of ms-2 and ms-6 exhibited lower percentage pod set, while ms-7 had the highest percentage of both tall and dwarf plants. Seed from the open pollinated pods were grown to determine floral phenotype. It was expected that fertile progeny were the result of outcrossing while most ms progeny were due to selfing. However, as much as one-third of the progeny could be male sterile due to outcrossing in a closed, randomly mating F_ population. Because these ms lines were grown in the nursery among many other pea lines, the percentage of ms progeny due to outcrossing would be somewhat less than one-third. As shown in Table 2, ms-2, ms-5, and ms-6 exhibited 25.2% or fewer male sterile progeny, suggesting that these genes confer a high degree of male sterility. All other male steriles showed 43.2% or greater ms progeny which indicates varying amounts of fertility restoration.

Bumblebees appeared to be the primary insect vector and were observed gathering both pollen and nectar from older flowers. In particular ms-2, ms-5, and ms-6 may have some value In facilitating recombination where large amounts of crossed seed are required.

1. Loennig, W.-E. 1983. PNL 15:40.
2. Myers, J. R., and E. T. Gritton. 1984. PNL 16:60-61.
3. White, 0. 1917. Proc. Am. Phil. Soc. 56:487-588.

Table 1. Percentage of male sterile pea plants with at least one open-pollinated pod set under field conditions. The results of crosses to marker lines are pooled within each male sterile.

Male sterile	Plant height	ms plants with pods (%)
ms-2	le	15.4
ms-5	Le	81.1
ms-5	le	30.7
ms-6	Le	62.7
ms-6	le	13.1
ms-7	Le	95.2
ms-7	le	41.0
ms-9	Le	58.8
ms-10	Le	68.1
ms-11	Le	81.8
ms-11	le	25.0

Table 2. Percentage of progeny with male sterile phenotype from open-pollinated seed set on field-grown male sterile plants.

Male sterile	ms progeny (%)
ms-2	1.6
ms-3	100.0
ms-5	19.0
ms-6	25.2
ms-7	57.3
ms-9	46.8
ms-10	79.1
ms-11	43.2