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THE POLLINATION REQUIREMENTS OF INSECT-POLLINATED SEED CROPS

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As shown in the accompanying list, over 60 seed crops grown in the United States (exclusive of ornamentals and medicinals) are known to require or benefit from insect pollination. Because they are self-sterile or need an outside agent to transfer the pollen, many of the crops on this list are almost entirely dependent on insects. Others, such as cotton and safflower, can achieve satisfactory yields without insects, but under most circumstances, their yields are increased by insect visitation. The degree of dependence often depends on the horticultural variety. In general, for obvious reasons, plant breeders have bred towards self-fertility and automatic self-pollination. This process has apparently resulted in a loss of features of attractiveness to pollinators and in adaptations for cross pollination. Consequently, if hybrid seed is to be grown for such crops, it may become necessary to re-incorporate some of the original characteristics. For example, the tomato, primarily cross pollinated by bees in its homeland, Peru, is elsewhere largely auto-self pollinated and unattractive to bees. Growers of hybrid tomato seed are at present forced to resort to hand pollination.

The honey bee is an effective pollinator of most seed crops, but it should be kept in mind that only a few crops, such as white sweetclover, are attractive enough to the honey bee to be relatively unaffected by other attractive sources of nectar and pollen within flight range of the bees. In the accompanying list, asterisks are used to indicate the crops for which the honey bee, for one reason or another, is relatively ineffective as a pollinator. However, the honey bee provides some pollination for each of these crops and for some of them, such

as alfalfa and red clover, it is the most important pollinator under the proper conditions.

The number of colonies of honey bees needed per unit area depends upon many factors other than the pollination requirements of the crop in question. Among these are colony population, weather conditions, attractiveness of the crop to pollen and/or nectar collectors, and the amount and attractiveness of other pollen and nectar sources. Consequently, the grower should manipulate the above factors to his advantage insofar as possible and then bring in colonies until the desired population density is reached. This density, which depends principally on the number of flowers that need to be pollinated and the efficiency of the bees, may vary from as little as one bee per 5 square yards in a melon field to 5 bees per square yard in a sweetclover field.

Alfalfa seed fields in the intermountain west and northwest are pollinated best by various wild bees. Populations of two species, the alkali bee and the alfalfa leafcutter bee, are often managed successfully by the growers. Populations of either species at levels of 2,000 to 5,000 bees per acre should result in maximum seed yields.

SEED CROPS (EXCLUSIVE OF ORNAMENTALS AND MEDICINALS)
 GROWN IN THE UNITED STATES AND KNOWN OR PRESUMED
 TO REQUIRE OR BENEFIT FROM INSECT POLLINATION

*alfalfa	clover (strawberry)	mustard (black)
anise	collards	onion
asparagus	*cotton	okra
*bean (field or broad)	*cowpea	parsley
bean (lima)	crass	parsnip
*bean (scarlet runner)	* <u>Crotalaria</u> spp.	pepper (bell)
broccoli	*crownvetch	pepper (chili)
brussels sprouts	cucumber	pumpkins
buckwheat	cumin	radish
cabbage (European)	dill	rape (turnip)
cabbage (Chinese)	eggplant	rape (Swede)
caraway	fennel	rutabaga
carrot	flax (inc. linseed)	safflower
cauliflower	horseradish	sainfoin
celery	kale	sesame
chives	kohlrabi	squashes
clover (alsike)	kudzu	sunflower
" (crimson)	leek	sweetclover (yellow)
" (Dutch)	<u>Lespedeza</u> spp.	" (white)
" (Egyptian)	lupin (blue)	trefoils
" (ladino)	" (yellow)	turnip
" (Persian)	melons	vetch, hairy
* " (red)	mustard (field)	watermelon

* Crops for which pollination by honey bees presents special problems.