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## **A USDA plan to assist in field insectary establishment for biological control of leafy spurge**

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The process of foreign exploration and specificity testing that has led to the importation and establishment of effective biological control agents has been long and diligent. Owing to USDA, ARS, Agriculture Canada, and certain state programs, APHIS has had the opportunity to implement biological control of leafy spurge.

APHIS has been involved with the project of implementation of biological control of leafy spurge since 1988. APHIS activities have centered around importation and release of USDA-approved biological control agents for leafy spurge. These releases have been accomplished in 15 states in areas infested with leafy spurge. The objective in releasing these natural enemies has been to initiate self-sustaining populations in classical biocontrol style of these beneficial insects over the broad area of leaf spurge infestation. By 1993, many insects released in field insectary sites (FIS) had reached populations that were ready to be harvested or collected and moved to other spurge locations in a continued redistribution effort.

Knowing that redistribution of natural enemies by man will increase the amount of dispersal of the insects and subsequent control of leafy spurge, APHIS has developed a plan to facilitate these efforts by State Departments of Agriculture and Cooperators. The plan is a three-phase activity which allows for a transfer of technology and management of leafy spurge field insectaries from APHIS to State Departments of Agriculture and co-operators.

### **Phase 1 (Introduction and establishment)**

**Objective: Introduction, release and establishment of exotic natural enemies in the United States.**

**Approach:** After sufficient research abroad and locally, including host specificity testing, and consulting or planning with the States, exotic natural enemies of a specific weed will be imported and properly screened in quarantine and approved by USDA for

field release, or acquired from USDA, Agricultural Research Service, personnel or other State Cooperators. These natural enemies will initially be released in small numbers at selected sites (Field Insectary Sites – FIS). The release sites would be well-defined and protected areas that are free of any pesticide applications and grazing. These sites will be limited in number depending on the availability of specimens collected and approved for release through the appropriate importation and permit procedures as required. These sites may be in several states or only one state; possibly they could be confined to only one county in any given state.

**Roles:** APHIS is responsible for importing or locally acquiring available natural enemies, clearing the organisms through quarantine when appropriate, and acquiring necessary permits. The initial release sites would be carefully selected by APHIS with the assistance of various State cooperators. APHIS has the main responsibility in Phase 1 and will track, protect, and maintain these critical sites for several years in order to promote natural population increases of a particular species. The natural enemies produced at such a location then become available for release into additional Phase 1 FIS for additional increase of population, or the natural enemies are made available for redistribution to all infested States, which activity constitutes Phase 2.

**Timeline:** The time required for Phase 1 between the initial introduction of a natural enemy and its increase in population density to levels considered sufficient for redistribution may be from 2 to 5 years, depending upon the species, the initial number of individuals released, reproductive potential, and other factors affecting population development.

## **Phase 2 (Collection and redistribution “to” states)**

**Objective: Establish “state” FIS in all weed-infested states collected from Phase 1 FIS.**

**Approach:** Collect and redistribute the exotic natural enemies from Phase 1 into new FIS in all weed-infested States. Phase 2 releases would occur in each State that expressed interest and approved the establishment of each specific natural enemy. APHIS and the State will cooperatively determine the optimal number and location of the FIS for that State. The release sites will serve: (1) as the source of field-propagated natural enemies to be made available in 2 to 5 years for continued redistribution in Phase 3, and (2) as demonstration plots, showing the potential impact of the natural enemies on the targeted weed in that particular State.

**Roles:** The establishment of a Phase 2 FIS is a joint cooperative effort by APHIS and State Departments of Agriculture and/or other Cooperators. During Phase 2, APHIS will provide resources for the collection of the natural enemy out of Phase 1 FIS, and (working cooperatively with the State) select sites within each State for the release and establishment of those same natural enemies within “State” FIS. APHIS will be responsible for developing limited numbers of educational materials for landowners and the general public. These materials will be available for reproduction and distribution as necessary by the State cooperators, including the extension service. APHIS will provide technical informa-

tion to the State and other cooperators in the form of actual training and training manuals for each specific weed program as needed.

**Timeline:** The time required from the initial releases in Phase 2 to the collection and redistribution will vary with the species of natural enemy, but it will be at least 2 years before any sizable numbers of individuals could be collected for redistribution purposes. These sites could be available indefinitely if host plant material prevails, or depending on how heavily the “State” FIS is used for collection purposes from year to year.

## **Phase 3 (Collection and redistribution “by” states)**

### **Objective: Collect and redistribute natural enemies within the state from Phase 2 FIS.**

**Approach:** Natural enemies collected from Phase 2 FIS will be redistributed within each state by the state or their authorized parties. These releases may be directed at the state, county, or landowner level for establishment throughout the state.

**Roles:** The state will be responsible for further collection and redistribution from Phase 2 FIS throughout the state. The establishment of additional FIS within each county and/or at individual landowner sites will be determined by the state Department of Agriculture and/or other cooperators. The actual collection and redistribution of natural enemies from the FIS developed in Phase 2 is the sole responsibility of the State Department of Agriculture and/or other cooperators. At this time, commercial insectary operations and the general public could approach the state for approval to collect and redistribute at their own expense, or commercial groups could ask for starter culture material for their own private FIS establishment for further distribution for profit. Commercial groups be given the authority by the states to the sole manager of collection and redistribution efforts within that state. The redistribution efforts could be: (1) supported within internal state or county resources, or (2) be based on a “user fee” charged by the state, or (3) be turned over to commercial biological control specialist, who could be afforded the opportunity to collect and sell within that state to county weed board or private landowners.

**Timeline:** Phase 3 could be continued until all counties have established adequate number of FIS with further occurring under natural dispersal, or through wide redistribution efforts by the county personnel, commercial groups, or landowners themselves.

The subsequent success of *Aphthona* spp. populations buildup and spurge suppression have caused all of us involved in the biological control aspects to immediately develop plans to maximize the benefits of these biological control agents. In 1994, development of Phase II insectaries and broad redistribution from state field insectaries has occurred in CO, MN, MT, ND, and WY. In 1994, APHIS has augmented Phase I FIS with redistribution of U.S. collected *Aphthonas* to 15 states.