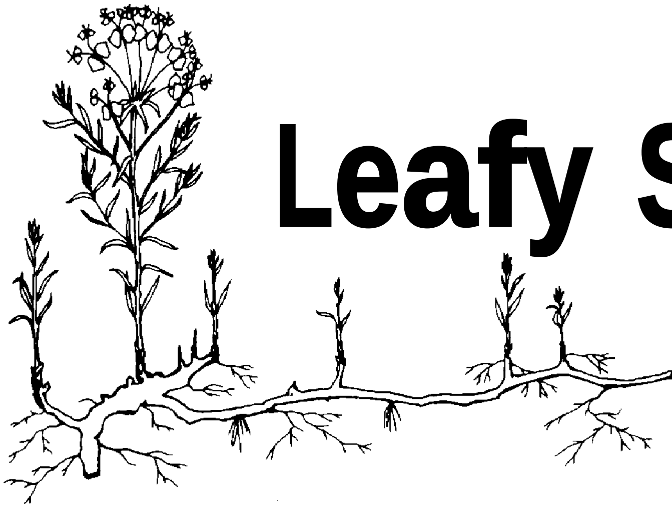

Leafy Spurge *News*

Agricultural Experiment Station
NDSU Extension Service
North Dakota State University, Fargo, ND 58105

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From The Editors Desk

What follows is what I would call Brandon Ramblings; what I saw and heard at the l996 Brandon Leafy Spurge Symposium. First off, I must congratulate Carla Pouteau and her crew for selecting an excellent facility, quite spacious, and the chairs were a cut above those usuallly supplied for such meetings. Over 90 persons participated from 4 Canadian Provinces, and 8 States. Thanks to 10 industry sponsors, the "nutritional breaks" were delicious and plentiful. I am sure no one left Brandon hungry!

The program consisted of 15 presentations and 8 posters, a field tour and a visit to the Agriculture and Agri-Food Canada Research Facility. In addition we had a Texas Scramble Golf Game (also known as best ball) and pizza night. It was lots of fun and every one who played got a souvenir. To top it all off, we had a tasty catered Barbecue in Queen Elizabeth Park.

I overheard someone say that the information from the sheep grazing trials was really not new. But we should remember that it is an excellent idea to repeat most of the trials under different situations, and different environments. I was quite impressed with the Research Facility built in a south facing slope to get the maximum sun, a very functional design.

Some of you may wonder where the **Leafy Spurge *News*** is sent to. As of the last mailing (1639), 33% was in North Dakota, 25% in Montana, 14% in Nebraska, 4% in Minnesota, South Dakota and Wyoming, and 3% in Colorado. It is sent to 32 states and The District of Columbia as well as 4 foreign countries including Canada.

In this issue, you will find about a third of the abstract of papers given at Brandon. Remember that I do not list all of the authors that presented papers, only the lead author so that you can contact that person. The remaining abstracts will appear in future issues. Once again if you have any information about leafy spurge you would like to share with some the other 1650 readers, then please send it to me as my news staff is rather limited, down to one, me!

A year ago the first **Leafy Spurge Honoree** appeared, and since I have not gotten any negative feedback we shall continue. The honoree for this issue is Dr. Peter K. Fay, who just retired, this year, from Montana State University. He sent me the information shown below. I have only included that which is pertinent to leafy spurge.

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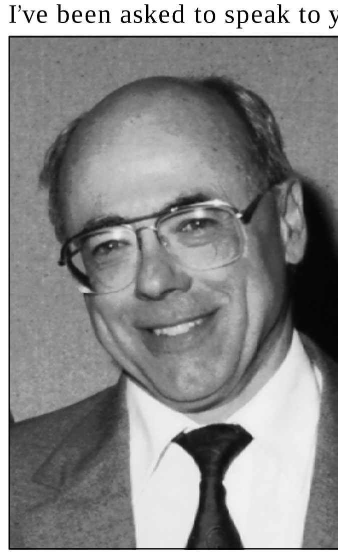
Leafy Spurge Honoree

Successes And Failures of Alternative Methods of Weed Control

I've been asked to speak to you today about some of the research we have done for the past 16 years at Montana State University. I am a conventional weed scientist working with herbicides similar to weed scientists all over the world. When we have a weed problem, we look for a herbicide that will control the weed, determine how much herbicide



Pete Fay

we need and when to put it on and, often, the problem is solved.

Fifteen years ago, in 1978, the Dean of Agriculture asked me to work on leafy spurge (*Euphorbia esula* L.). I was working on the weeds in cultivated crops. Since I was new on the job, I agreed, and that's when I began to work on the **"weed from Hell,"** leafy spurge.

I called weed scientists in other states who had worked on spurge. I asked them what herbicides do I use? When do I put it on? The answer was Tordon applied in the middle of June. That's what I did, I applied Tordon, and sure enough, I got excellent control – for one year. When I returned to the plots the second year after spraying it was difficult to see where I had sprayed it with a herbicide. It was obvious that the premier herbicide, Tordon, did not provide long term control. Even worse, the cost of treatment was way out of line with the value of the land infested with leafy spurge. It was at that point that I realized that 1) I can't invent new herbicides, the chemical industry does that and 2) since no inexpensive herbicides existed that would control leafy spurge, it would be a long time before we had one, if ever. That's when I began to work on alternative methods of weed control:

Grazing. Cows are the only grazing animal that don't graze spurge. Sheep and goats eat it readily after a brief but very important introduction to it. Sheep eat approximately 50% spurge/50% grass. Goats will eat less spurge if a wide variety of forage is available. They'll eat lots of spurge if no other forbs or brush are available.

Grazing ***will not*** eliminate spurge. It only provides short term control. There are, however, many ranchers in Montana who are profiting from leafy spurge instead of losing money with herbicides.

Grazing is overvalued by "chemophobes" as a means of control. Few infestations are suitable for grazing because of predators, lack of fencing, lack of sheep, the cost of transporting sheep or goats, the scarcity of competent herders, and the pervasive cowboy mindset towards "wooly maggots".

Cows. We fed spurge hay to cows. It didn't hurt them but they stayed hungry on spurge. We have some proof that spurge hay is unpalatable to cows. We did not experiment with feed blends or additives like molasses which might make spurge hay palatable and therefore useful.

Electro Shocking. We delivered 14,000 volts of electricity to individual spurge plants. They became slightly wilted but recovered fully in 30 minutes so there appears to be no potential for this technique.

Compacting Spurge. This work was the result of a rancher's observation that "car tracks through spurge control spurge". Compacting with a land roller reduced growth of spurge for a month or two.

Mowing. Spurge has a summer dormancy. If mowed at the correct time (early August), it will not regrow vigorously until the roots receive a short period of cold temperatures, at the correct time. Mowing works well but is rarely feasible on the type of land infested by spurge.

Mulching. Black plastic works but it must cover an area many times the size of the patch because the roots creep horizontally for long distances in search of light.

Pulling. Spurge pulls easily from the ground. We tested two machines which worked. The control the following year was slightly better than with 2,4-D. Again, this technique is not suited for very many infestations.

Disease Introduction. We have applied several disease organisms to spurge without success. We cultured *Alternaria* spp. and sprayed it on without effect. We captured spores as we sprayed to confirm that live spores were delivered to the plant but very little establishment was observed.

Fertilizing and Irrigating. Some weeds cannot compete in moist, fertile settings with other vegetation so we fertilized and irrigated spurge in an attempt to control it. Fertilized and irrigated spurge thrived.

The Value of Spurge

Hydrocarbons. Spurge contains valuable hydrocarbons in the latex. Unfortunately hydrocarbons yield per acre from spurge is much below numerous other latex bearing plants. Someday we will gather gasoline substitutes like hydrocarbons from plants but it won't be spurge.

Fuel Value. Leafy spurge hay is an excellent heating fuel. It pellets well and ignites easily. It is energy-rich because it contains 10% oil.

Unfortunately, spurge, like most herbaceous plants, contains about 7% ash after burning, 10 times more ash than wood. We built a stove with an auger to permit easy ash removal. The stove also needs a stirring bar to remove ash from the fire to present smothering. Our calculations show that 7 tons of pellets are needed to heat a house for one year. Spurge under Montana conditions will produce up to 7 tons of hay per acre in one cutting. One to four acres of spurge infested land would be needed to heat a home for one year. Someday we will have sterile, hybrid spurge varieties which will be used to heat homes.

In conclusion, we presently believe that leafy spurge is "**The Weed from Hell.**" I feel we should not overlook its potential as a forage, and as a home grown heating fuel. As Albert Einstein once said, "Everything changes except the way we think."

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Park Provides Biocontrols To Its Neighbors

The National Park Service staff at Theodore Roosevelt National Park hosted a field day on July 2, 1996, for the distribution of flea beetles, *Aphthona nigriscutis* used in the biological control of leafy spurge. Over 500,000 *A. nigriscutis* were collected and distributed to some 50 neighboring ranchers and county weed board members.

Participants were provided an education briefing about biological control of leafy spurge by the North Dakota Department of Agriculture and USDA-Animal and Plant Health Inspection Service. Participants then visited field insectary sites in the park and on the Little Missouri National Grasslands – Medora Ranger District for hands-on collecting. Insects pre-collected from insectary sites within the park, Morton County and the Little Missouri National Grasslands were given away. Interagency partners also included the Forest Service and Billings/ Golden Valley County Badlands Leafy Spurge Program that assisted with collection and user education. The National Park Service plans to offer collecting days again next year.

Update on Leafy Spurge Management within Theodore Roosevelt National Park

Infestations of leafy spurge in the South Unit are estimated at 1,800 to 4,200 acres. Significant ecological disruption of plant communities continues to occur as monocultures of leafy spurge replace native species and threatens wildlife habitat. The park's staff redistributed 1.7 million insects to 812 sites during the 1996 season.

The park has released eight different species, three million insects to 1,665 sites since 1987. Refer to the **Leafy Spurge Biocontrol Release Summary** shown below, for insect species, numbers released and numbers of sites. Preliminary monitoring has shown over 70% success in establishment of the various biocontrol species.

The park uses various types of Integrated Pest Management (IPM) control techniques to manage leafy spurge. In addition to biocontrols, this was the fourth year that the park has used specially-equipped micro-foil boom helicopters to spray leafy spurge. Approximately 352 acres were aerially sprayed. A road right-of-way spray project was also initiated. Integrated methods are needed over the long-term to combat this tenacious noxious weed.

Partners helping the park have included the Rocky Mountain Elk Foundation, DowElanco, Billings and Golden Valley County Weed Boards, Medora Grazing Association, USDA-Agricultural Research Service, USDA-Animal and Plant Health Inspection Service, U.S. Forest Service, North Dakota State University, North Dakota Department of Agriculture, and local ranchers/ landowners in the Weed Innovation Network (WIN) Program.

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Integrated Control of Leafy Spurge(Euphorbia Esula) with Bozoisky Russian Wildrye (Psathyrostachys Juncea) and Luna Pubescent, Wheat Grass (Agropyron Intermedium var. Trichophorum)

A study was established near Devil's Tower in Crook County, Wyoming to determine the potential of Bozoisky Russian wildrye and Luna pubescent wheatgrass competition as an alternative to repetitive herbicide treatment for control of leafy spurge. Grasses were seeded with or without tillage August 8, 1989. Glyphosate was applied before seeding grasses in 1989 to eliminate weed competition with seedling grasses. Applications of 2,4-D and metsulfuron were applied after seeding to control annual weeds. Evaluations made 7 years after seeding have been based on one or more of the following: percent grass stand, plants per 20 ft of row, percent leafy spurge control, percent downy brome infestation, grass yield, and percent canopy cover.

The tilled areas had significantly more plants per 20 feet of row than did the no-till areas for Bozoisky. There was no difference between till and no-till for Luna. The tilled areas had significantly less downy brome than did no-till areas. There is more downy brome in the Bozoisky than the Luna. The downy brome infestation appears to be on the increase. Both grasses had very good yields in the tilled areas and good yields in the no-till areas. Luna has produced more forage than Bozoisky in both the tilled and no-till areas. Luna is maintaining excellent control of leafy spurge in both till and no-till areas (91% in the tilled plots and 86% in the no-till plots). Control in the Bozoisky till plots is at 90% and is 71% in the no-till plots. Percent canopy covers show leafy spurge to be on the increase in both till and no-till plots for both grass species. The increase is greatest in the Bozoisky no-till plots. Both grasses initially had very good establishment in the till and no-till areas and have maintained excellent to fair leafy spurge control 7 years after seeding.

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Simple Technique For Estimating Aphthona Spp. Numbers for Redistribution

Obtaining *Aphthona* spp. flea beetles for redistribution involves three steps: 1) collection of beetles, 2) separation of beetles from debris and other insects, and 3) estimation of the number of beetles collected. A standard sweep net is used to collect the beetles and a soil sieve or perforated PVC pipe can be used to separate beetles from debris and other insects (see abstract by Hirsch in this issue). The most time consuming portion is counting the insects to be redistributed. The number of *Aphthona* spp. for redistribution can be estimated using a volumetric technique to increase the speed of the counting.

The flea beetles, *A. nigriscutis*, *A. czwalinae*, *A. lacertosa*, and *A. cyparissiae* are similar in size and can be counted volumetrically using water as a standard. Approximately 100 beetles occupy the same volume as 1 ml of water. Using this relationship any container calibrated in milliliters can be used to estimate the number of flea beetles. This method is most accurate when samples are free of debris and other insects.

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Weed Biocontrol – Lessons Learned from Leafy Spurge

Leafy spurge has been a difficult target for biocontrol. The problems are outlined and lessons learned in solving them are discussed. These are: 1) Start a project by identifying the damage-type most harmful to the weed and select an insect doing this type of damage from the literature. 2) Agents are best if from the climatic analogue of the release area, but others can often be adapted. 3) Have patience. Results of spurge control in Spruce Woods Park, Manitoba are discussed. 4) Use consortia for agent distribution and for funding overseas studies. 5) Introduce the agent from the population tested. 6) Lessons relating to the enabling legislation and the release approval process. Problems have reached a crisis point and unless changes are made biocontrol of weeds with native congeneric species, such as leafy spurge, will cease.

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Simple Technique For Separating Aphthona Flea Beetles From Debris

A contribution of USDA APHIS PPQ in North Dakota to the management of leafy spurge is to provide *Aphthona* flea beetles from insectaries to county weed boards or other land managers. One problem encountered by field crews harvesting flea beetles with nets is they often sweep up more plant debris and other insects then flea beetles. The debris makes it difficult if not impossible to accurately count and package flea beetles for redistribution.

APHIS PPQ in North Dakota utilizes the volumetric method for counting *Aphthona* flea beetles as developed by the APHIS Bozeman Biocontrol Lab. We have found it to be an efficient and practical in-the-field technique for counting large numbers of flea beetles. The process of counting the beetles volumetrically for redistribution can be performed quickly and easily by first using the following sorting technique devised this season. The sorting and counting is done in conjunction with an assembly line system of packaging beetles. Field crews have utilized this technique at an excellent site to package approximately 2 million beetles, one thousand beetles per package, in one day. Weed board officials or others who are redistributing beetles to land managers may find the technique useful.

The sorting system uses plastic pipe, 4 inches in diameter and 6 inches long, that is perforated using a 3/16th inch drill bit. To save weight, we use pipe rated only for vent and drain. It is thinner walled than pipe rated for water lines. Plastic end caps for this pipe are used and also perforated. One cap was glued onto the perforated pipe and the other is used as a lid. We use white pipe to reflect heat, however, the inside of the pipe is sprayed with black paint so that the only light entering the pipe is through the holes.

The premise of this tool takes advantage of the flea beetles extreme attraction to light. The perforated containers (sorters) are filled approximately 1/3 to 1/2 full of the beetles and debris. Six of the sorters are placed into a 18 by 24 inch white nylon bag with a drawstring. The bag is exposed to direct sunlight and because of the beetles attraction to light, they escape the sorters and are captured in the bag. The sorting tubes then contain only plant debris, grasshoppers and other insects. This process only takes several minutes. The volumetric counting method can then be used with greater ease and accuracy. Nylon or muslin bags are recommended to use with the sorters over mesh bags because the beetles cling to mesh materials.

We have experimented somewhat with the size and number of holes in the sorting containers. Generally, we have found that you cannot have too many holes but if the holes are too large, other insects and small debris begin to come out with the beetles.

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Biological Control of Leafy Spurge in Alberta

A co-operative effort between Alberta Agriculture, Food and Rural Development, the Alberta Environmental Centre and Agriculture and Agri-Food Canada and the International Institute of Biological Control in Delemont, Switzerland has seen a large number of biological control agents released in Alberta for the control of leafy spurge. Alec McClay, Alberta Environmental Centre and Peter Harris, Agriculture and Agri-Food Canada, Lethbridge, Alberta have been instrumental in introducing new insect biological control agents into the province for study and monitoring. Once an agent has "proven itself" and there are large numbers available at some of the more successful sites, the Agronomy Unit and Public Land Services of Alberta Agriculture, Food and Rural Development have become involved in the distribution of the biological control agent to suitable sites. The distribution of the most successful agent in Albert, *Aphthona nigriscutis*, has been through "hands-on" redistribution clinics involving the municipal district agricultural fieldmen and producers. Local producers and agricultural fieldmen further redistribute from the more heavily populated agent sites or collection centres in their area.

Leafy spurge is conservatively estimated to infest 15,000 acres in Alberta. There have been over 150,000 *A. nigriscutis* released at over 400 sites in Alberta. At one site the leafy spurge biomass was reduced from 172 gm^{-2} down to 2 gm^{-2} in 5 years with a corresponding increase in grass biomass from 1 gm^{-2} up to 57 gm^{-2}. Only the initial *Aphthona flava* release in Alberta is providing beetles for further redistribution with few of the other 44 releases establishing. As other biological control agents are needed for lower lying, higher moisture and shaded sites, the root-feeding *Aphthona cyparissiae*, *Aphthona czwalinae* and *Aphthona lacertosa* are being tested in Alberta as well as the stem-mining fly *Pegomya* spp., the gall fly *Spurgia esulae*, and the moth *Minoa murinata*.

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Update on Wyoming's Leafy Spurge Program

The Control of Leafy Spurge with Initial and Retreatments of Picloram

This research was conducted near Devil's Tower, Wyoming to compare the efficacy of various rates of picloram for leafy spurge control. Plots were retreated to maintain or attain 80% control with light rates of picloram or picloram/2,4-D tankmixes. Initial treatments were 0.25 lb picloram to 2.0 lb picloram in 0.25 lb increments and 0.25 lb picloram + 1.0 lb 2,4-D. Retreatments were 0.25 or 0.5 lb picloram or 0.25 lb picloram + 1.0 lb 2,4-D. The initial treatment of 0.25 lb picloram was retreated only with 0.25 lb picloram and the initial treatment of 0.25 lb picloram + 1.0 lb 2,4-D was retreated only with 0.25 lb picloram + 1.0 lb 2,4-D. Plots were 10 by 27 ft. with four replications arranged in a randomized complete block. The initial herbicide treatments were applied May 24, 1989. Retreatments were applied June 6, 1990; June 13, 1991; June 10, 1992; September 22, 1993; and September 19, 1994. The soil was a silt loam (22% sand, 58% silt, and 20% clay) with 1.8% organic matter and a 6.3 pH. Leafy spurge was in full bloom and 12 to 14 inches in height, for the initial treatments and in full bloom, 12 to 20 inches in height for spring retreatments and 16 to 24 inches in height for fall retreatments. Infestations were heavy throughout the experiment area. Visual weed control evaluations were made June 6, 1990; June 13, 1991; June 10, 1992; June 21, 1993; June 15, 1994; June 27, 1995; and June 18, 1996.

Plots with initial treatments of 1.25 lb picloram or greater in 1989 provided 80% or better leafy spurge control and did not require retreatment in 1990. Initial treatments maintaining 80% control or better in 1991 were 1.5, 1.75 or 2.0 lb picloram treatments. Initial treatments of 2.0 lb picloram were the only treatments maintaining 80% control or better in 1992. The only 1990 retreatment attaining 80% control or better in 1991 was 0.5 lb picloram over an initial 1.0 lb of picloram. None of the retreatments applied in 1991 attained 80% control in 1992. None of the retreatments applied in 1992 attained 80% control in 1993. All 0.5 picloram retreatments applied in the fall of 1993 attained 80% control or better in 1994. One 0.25 picloram + 1.0 2,4-D retreatment applied over an initial treatment of 1.5 picloram attained 80% control in 1994. None of the 2.0 lb picloram treatments have maintained 80% since 1993. No treatments maintained 80% in 1995 and control is declining. Spring retreatments of picloram at 0.25 or 0.5 have not been effective in attaining or maintaining 80% control. Spring retreatments of 0.25 lb picloram + 1.0 lb 2,4-D appear to be as effective as spring retreatments 0.5 lb picloram. However, spring retreatments of 0.25 lb picloram + 1.0 lb 2,4-D have not attained or maintained 80% control. Fall retreatments of 0.5 lb picloram or 0.25 lb picloram + 1.0 lb 2,4-D may be effective in attaining or maintaining 80% control. The most effective long-term treatment for control of leafy spurge was 2.0 lb picloram.

The Control of Leafy Spurge with Imazameth

The objective of this study was to compare the efficacy of imazameth for leafy spurge control. The plots were 10 by 27 ft in a randomized complete block design with four replications. Treatments were imazameth at one, two and 4 oz ai/a with or without a crop oil concentrate and picloram at 0.5 lb ai/a. Treatments were applied with a hand-held $C0_2$ pressurized six-nozzle sprayer (20" spacing) delivering 20 gpa at 40 psi. Treatments were applied September 26, 1995 and evaluated June 18, 1996. Leafy spurge was mature and 16 to 24 inches tall. The soil was a silt loam with 22% sand, 58% silt, 20% clay; with 1.8% organic matter and pH 6.3. Depth to parent material is approximately 27 inches.

Imazameth at 4 ox/a plus a crop oil concentrate provided the best control (87%). Without the crop oil concentrate control was only 69%. The addition of a crop soil concentrate greatly improved leafy spurge control. No other treatments provided satisfactory control. There was little or no grass damage when imazameth was applied after grasses were mature in mid September. It appears that imazameth may have potential fit for control of leafy spurge.

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Aphthona Spp. Flea Beetle Movement Along Railroad Right-of Ways

Leafy spurge is often found in long narrow corridors such as railroad right-of-ways where it is difficult to treat. Two experiments were conducted to determine the establishment, population increase, and movement of *Aphthona* species flea beetles on a railroad right-of-way.

A. nigriscutis was released on June 28, 1993 in a dense stand of leafy spurge along a 2.5 mile stretch of the Burlington Northern railroad right-of-way near Buffalo, ND. There were five treatments consisting of 100, 200, 300, 400 and 500 adult insects distributed per release point. Release points were 260 feet apart and replicated three times. Stem density and adult flea beetle population were monitored in the spring and summer, respectively, at the release point and at distances 10, 25 and 40 feet in a semi-circle pattern from the release point.

A. nigriscutis flea beetles were found in all treatments each year after release and leafy spurge stem density began to decline in 1995. The stem density decreased from an average of 18 stem/0.25 m^2 in 1993 to 7 stems/0.25 m^2 in 1996. The greatest stem density decrease was 72% when 500 beetles/treatment were released. This decrease occurred 10 feet from the release point for all treatments where beetle populations were the highest. *A.nigriscutis* population in the 300 and 400 insects/release point treatments averaged 8 beetles/m^2 compared to 2 beetles/m^2 for all other treatments.

A similar experiment was established on July 10, 1995 with *A. czwalinae* along the Red River Valley and Western railroad right-of-way near Lisbon, ND. The number of insects used was increased to 500, 1000, 1500 and 2000 adults per treatment. Release points were 150 feet apart and replicated four times. Stem density and adult flea beetle population were monitored in the spring and summer, respectively, at the release point and at distances of 10, 30 and 50 feet in a circular pattern around the release point.

A. czwalinae were found at all release sites in 1996. The average stem density in the 2000 insects/release point declined from 21 stems/m^2 to 15 stems/m^2 1 year following release while stem density in all other treatments was unchanged. Flea beetles will establish on industrial sites such as railroad right-of-ways. The larger the number of insects released the more rapid the leafy spurge stem density declined.

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Effect of Fall-Applied Picloram and 2,4-D on Aphthona Nigriscutis Populations

Aphthona nigriscutis has reduced the density of leafy spurge at many locations. However, there are locations where *A. nigriscutis* has not established or is found at densities too low to be effective. Therefore, it may be necessary to integrate biological and chemical control to reduce leafy spurge to satisfactory levels. The objective of this experiment was to determine the effect of picloram and 2,4-D fall-applied in the field on *A. nigriscutis* population.

Experiments were conducted at two locations, Chaffee and Fort Ransom, North Dakota which average 90 to 63 leafy spurge stems/m^2, respectively. Approximately 350 *A. nigriscutis* adults were released into 1.8-by 1.8-by 1.8-m cages on June 22, 1995. An additional 100 *A. nigriscutis* adults were released on July 14, 1995. The herbicides picloram plus 2,4-D at 0.56 plus 1.1 kg/ha were applied on four dates, August 15, September 1 and 15 and October 1.

The effect of picloram and 2,4-D on *A. nigriscutis* population was estimated by counting the number of adults emerging from soil cores harvest October 30, 1995 and May 28, 1996 and adults collected in the field in June and July 1996. A golf cup cutter was used to harvest soil cores which were 10.8 cm diameter to a depth of 15 cm, and sample harvested in October were held at 3 C for 75 d. Each sample was then placed into a 2L paper container and covered by a trap chamber, which was a clear plastic cylinder with a mesh top. Trap chambers with soil cores were maintained in the laboratory at 21 C for with a 16 h photoperiod until *A. nigriscutis* adults emerged. Soil cores harvested in May were placed directly in trap chambers and treated identically to soil cores harvested in October. An insect sweep net was used to collect *A. nigriscutis* from the cage area and portions of the border which totalled 4.5 m^2.

Leafy spurge density averaged less than 1 stem/0.25 m^2 on June 5, 1996 regardless of herbicide application date or location. The number of *A. nigriscutis* adults emerging from soil cores obtained in fall and spring was similar regardless of herbicide application date or location. An average of 2 *A. nigriscutis* adults were recovered from each soil core harvested in the fall compared to only 1 per core from spring harvested samples, which indicates overwintering mortality. Peak field emergence of *A. nigriscutis* adults averaged 33/4.5 m^2 on July 10 at Chaffee and 7/4.5 m^2 on July 18 at Ft. Ransom. The number of *A. nigriscutis* collected in the field was similar regardless of herbicide application date at each location.

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Let's Say Goodby to Leafy Spurge

The intent of the project was to study and understand aspects of leafy spurge required for growth and development that helps it to spread, rather than to find specific herbicides for its control. Canavanine, an amino acid found in the jack bean plant, is known to inhibit the gowth of other plants. It was determined here that it will also inhibit the growth of leafy spurge. Indole-3-butyric acid (IBA) promotes root growth.

Leafy spurge seeds were germinated on nutrient media solidified with 0.7% Phytagel, a clear gelling agent. Canavanine, IBA or a combination of the two were dissolved in the media. One cm segments of the dark-grown hypocotyls were placed onto the media; 8 segments per 6 cm plastic Petri dish. Also, one cm segments of roots from the same dark-grown seedlings were placed onto the same media, in glass test tubes. The tissue was grown in the dark, at 28C for 28 days, at which time roots and shoots were counted. Field tests were also made using 0.01 to 2 mM canavanine with detergent sprayed onto the shoots.

It was found that canavanine inhibited both the formation of new roots and shoots, while IBA strongly promoted the formation of new roots. Canavanine+IBA stimulated root formation above that of canavanine alone in the cultures, but only to control levels and not to that of IBA alone. In field conditions, canavanine inhibited the growth of leafy spurge plants; 25% of the plants treated with 0.01 mM canavanine and 80% of the plants treated with 2 mM canavanine were dead 28 days after treatment.

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