Environmental Assessment

EA Number:
Case File No.:

Release of the Seedhead Weevil, Bangasternus fausti, for Control of Diffuse and Spotted Knapweeds, Centaurea diffusa and C. maculosa, in the USA

Location of Proposed Action: It is proposed to release the seedhead weevil, Bangasternus fausti, wherever its weedy hosts, diffuse and spotted knapweeds (Centaurea diffusa and C. maculosa), are serious problems and there is local interest in using biological control against these weeds.

Applicant: Sara S. Rosenthal, Research Entomologist, USDA-ARS-RWL, Bozeman, MT

Conformance with Applicable Land Use Plan: No such plan.

Need for Proposed Action:

Spotted and diffuse knapweeds are the most serious rangeweeds in the Pacific Northwest and are extremely important pests in Montana, Utah, Wyoming, and Colorado. An estimated 2.8 million ha in the Pacific Northwest are infested with spotted knapweed (Lacey 1989) and about 1.26 million ha in the western states are infested with diffuse knapweed (Lacey 1989). Spotted knapweed is known to reduce forage by up to 96% (French and Lacey 1983). The annual rate of spread of diffuse knapweed is 17.8% (Talbott 1987). These weeds reduce high quality forage wherever they infest rangeland. The knapweeds themselves have little nutritive value and high fiber content. While knapweeds may be controlled by herbicides and tillage, these practices are often not economically practical on rangeland. In many cases they are also not ecologically sound. Among the biological control agents already released in the USA to control knapweeds are two seedhead flies, Urophora affinis and U. quadrifasciata, and a seedhead moth, Metzneria paucipunctella. While these insects lower seed production considerably, it is not enough to lower plant populations. Another seedhead insect would be valuable in North America.

Description of Proposed Action:

It is proposed to release B. fausti, at several sites (exact locations have not yet been chosen) in the northwestern states where knapweeds are serious pests (Montana, Idaho, Washington, Oregon, Utah, Wyoming, and Colorado). At these sites its establishment, effectiveness as a biological control, and ability to spread will be studied. Eventually, if the weevil proves effective for reducing its hosts populations, it could become distributed, within its ecological limits, throughout the knapweed infested areas of North America.

Environmental Impacts:

Critical Element	Affected Yes	Affected No	Critical Element	Affected Yes	Affected No
Air Quality		X	T & E Species		X
ACECs		X	Wastes, Hazardous/Solid		X
Cultural Resources		X	Water Quality		X
Farmlands, Prime/Unique		X	Wetlands/Riparian Zones		X
Floodplains		X	Wild & Scenic Rivers		X
Nat. Amer. Rel. Concerns		X	Wilderness		X

Description of Impacts:

B. fausti has no impact on air quality.

It is not known to have any negative impact on areas of critical environmental concern.

B. fausti has no impact on cultural resources.

It has no negative impact on prime or unique farmlands. However, by damaging an introduced, weedy plant B. fausti may be expected to have some positive effect.

B. fausti has no negative impact on floodplains. It could have a positive effect if the weedy species it damages grew on the floodplain and were replaced by more appropriate species.

B. fausti would not have any effect on native American religious concerns unless the knapweeds interfere with plants important in such religions. In that case it would have a positive effect.

B. fausti would have no effect on threatened or endangered species. It is oligophagous to Centaurea species (C. diffusa, C. maculosa, C. calcitrapa, C. solstitialis, C. virgata ssp. squarrosa (Colonnelli and Whitehead 1989). There are two native North American Centaurea species, but neither of them is threatened nor endangered. C. americana is a locally common annual known from the Great Plains area from Texas north to Missouri (McGregor 1986). Two B. fausti eggs were placed on C. americana during tests in Rome during 1985. They hatched but the larvae did not survive beyond the first instar (unpublished report). C. rothrockii was not tested. It is found mainly on high mountain peaks in Mexico, but the northern tip of its range extends to higher elevations in the Chiracauhua Mountains in southern New Mexico and Arizona (Moore 1972). The closest North American species to Centaurea (subtribe Centaureinae) that are considered rare are in the genus Cirsium (subtribe Carduinae) (Dittrich, 1977). No Bangasternus species is known to feed on any Cirsium species (Colonnelli and Whitehead 1989).

B. fausti would have no impact on hazardous or solid wastes.

It would have no negative impact on water quality. However, if its release resulted in the reduction of herbicide use it could have a positive impact on water quality.

B. fausti would have no negative impact on wetlands/ riparian zones. If it reduced the population of its weedy host in or near such areas and herbicide use was reduced it would have a positive impact on wetlands.

It would have no negative impact on wild and scenic rivers, but could have a positive impact if its release reduced the chance that its weedy hosts would invade the vegetation along their banks.

B. fausti would have no negative effect on wilderness, but might have a positive impact if it slowed the invasion of wilderness by its weedy hosts.

Description of Mitigation Measures and Residual Impacts:

While Bangasternus fausti is not expected to have any negative impact, if one was discovered the effect of the insect could be mitigated by natural enemies imported from Europe or by any insecticide. In northern Greece, the eggs and larvae of B. fausti are often parasitized.

Finding of No Significant Impact/Decision Record.

I have reviewed this environmental assessment including the explanation and resolution of any potentially significant environmental impacts. I have determined that the proposed action with the mitigation measures described below will not have any significant impacts on the human environment and that an EIS is not required. It is my decision to implement the project with the mitigaion measures identified below.

Mitigation Measures/Remarks:

References and Persons Consulted

Campobasso, G., P. H. Dunn, L. Knutson, and S. S. Rosenthal. 1989. Petition for release of Bangasternus fausti (Reitter) for control of diffuse knapweed. 13 pp.

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Coombs, Eric. Oregon Department of Agriculture, Salem, OR

Cuda, J. P., USDA, APHIS. Bozeman, MT.

Dittrich, M., 1977. Cynareae - Systematic review. pp. 999-1016 in Heywood, V.H., J.B. Harborne and B.L. Turner. The Biology and Chemistry of the Compositae. Vol. II, Academic Press, New York. 1189 pp.

Dunn, P. H. and G. Campobasso. 1987. A petition for the introduction into quarantine for testing Bangasternus fausti (Reitter) Coleoptera: Curculionidae); a potential biocontrol agent of diffuse knapweed (Centaurea diffusa Lam.) 18 pp plus 6 tables.

French, R. A. and J. R. Lacey. 1983. Knapweed: its cause, effect and spread in Montana. Mont. Coop. Ext. Serv. Circular 307. 13 pp.

Lacey, C. 1989. Knapweed management: a decade of change. pp. 1-6 in P. K. Fay and J. R. Lacey, eds. Proc. Knapweed Symp., Apr. 4-5, 1989, Bozeman, MT. 245 pp.

Lang, Ron. USDA, APHIS. Bozeman, MT.

McGregor, R. L. 1986. 25. Centaurea. pp. 898-901. in Great Plains Flora Association. "Flora of the Great Plains". Univ. Press of Kansas, Lawrence, Kansas. 1392 pp.

Maddox, D. M. and R. Sobhian. 1987. Field experiment to determine host specificity and oviposition behavior or Bangasternus orientalis and B. fausti (Coleoptera: Curculionidae), biological control candidates for yellow starthistle and diffuse knapweed. Environ.Entomol. 16 (3): 645-648.

Moore, R. J. 1972. Distribution of native and introduced knapweeds (Centaurea) in Canada and the United States. Rhodora 74: 331-46.

Quimby, P. C. USDA, ARS, RWL, Bozeman, MT

Talbott, C. J. 1987. Distribution and ecologic amplitude of selected Centaurea species in eastern Washington. M.S. Thesis, Wash. State. Univ., Pullman. 186 pp.

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United States Department of Agriculture

Animal and Plant Health Inspection Service

Plant Protection and Quarantine
Mission Biological Control Laboratory
P.O. Box 2140
Mission, TX 78572

Subject: Bangasternus fausti compatibility with Urophora sp.

Date: January 8, 1991

To: Jack Coulson
USDA ARS Documentation Center
Insect Introduction Institute
BARC-East, Bldg. 476
Entomology Road
Beltsville, MD 20705

Enclosed please find a copy of the work accomplished in Bozeman, MT during the summer of 1990. Apparently J. Cuda gave his information to S. Rosenthal; however, that information has been difficult to obtain. The enclosed information was gleamed from reports prepared by J. Cuda, and the Materials and Methods submitted by R. Lang, biological technician with the APHIS Bozeman Biological Control Facility.

I believe the results suggest the compatibility of both species and feel that the TAG should accept this as fulfillment of the requirement for field release in the U.S. along with other support material from the Rome scientists.

Sincerely,

Lloyd E. Wendel
Laboratory Director

Enclosure

EXPERIMENTAL DESIGN

Dr. James P. Cuda and R.F. Lang, USDA-APHIS, S&T in consultation with Dr. Sara Rosenthal, USDA-ARS.

Problem: Will *Bangasternus fausti* out compete *Urophora* sp. as a biocontrol agent for Spotted Knapweed?

Materials:

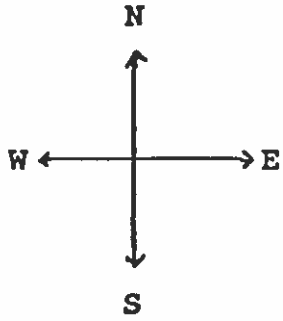
Small emergence cages designed by Cuda and Lang (unpublished) were used. The cages were made of 20 x 20 lumite screen and PVC pipe. The dimensions of the cages were 2.5 ft. x 2.5 ft. x 2.5 ft. The cages were placed over mature and well established Spotted knapweed plants with mature flower buds. Sixty *B. fausti* adults were originally collected and supplied to APHIS by the USDA-ARS laboratory in Rome, Italy. *Urophora* flies were randomly dispersed in the knapweed infestation used for the test and were considered to be the control treatment for the test. The knapweeds were growing in a chain link fence enclosure that had been set aside for work with biocontrol agents. The enclosure was secured and locked.

Methods:

The experiment was replicate 3 times. Each treatment consisted of 20 *B. fausti* adults introduced into each of the three cages. An additional 3 control plots were selected. *Urophora* spp. were present in larval, pupal and adult stages throughout the study area. The test plots wee randomly selected after the 6 cages had been placed in a linear pattern 2 feet apart. *B. fausti* were place into the test cages June 30, 1989 and were left undisturbed until October 12, 1989.

Four hundred mature knapweed seed heads were collected from each of the 6 cages. The seed heads were collected randomly from all areas of the plants; the top, middle, and bottom. The seed heads were then dissected in the laboratory, using a dissection microscope and the total number of *Urophora* spp. galls as well as the number and stages of *B. fausti* that were present or had emerged was recorded. The presence or absence or combination of the two of insects were noted.

Bangasternus fausti/Urophora sp. Competition Experiment on Spotted Knapweed, 1989



Cage 6	Cage 5	Cage 4	Cage 3	Cage 2	Cage 1
Treatment	Control	Control	Control	Treatment	Treatment

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TTEST PROCEDURE

Variable: UAGALLS ua galls/seedhead

TRT *	N	Mean	Std Dev	Std Error	Variances	T	Method	DF	Prob>|T|
1	1200	4.28333333	2.61828858	0.07558348	Unequal	26.2120	Satterthwaite	2065.0	0.000
2	1200	1.91666667	1.71089495	0.04938928			Cochran	1199.0	0.000
					Equal	26.2120		2398.0	0.000

For HO: Variances are equal, F' = 2.34 DF = (1199,1199) Prob>F' = 0.0000

* 1 = B. fausti (20 adults / cage)
2 = Control (no B. fausti)

Table 1. Co-occurrence of three spotted knapweed seed head insects. Field cage experiment, 1989, Bozeman, MT

U.A.[a]	U.Q.	B.F.	FREQ OBSERVED	FREQ EXPECTED	(O-E) E
+[b]	+	+	7	8	0.125
+	+	-	100	118	2.745
+	-	+	6	12	3.000
-	+	+	8	2	18.000
+	-	-	207	182	3.434
-	+	-	42	29	5.828
-	-	+	4	3	0.333
-	-	-	26	46	8.696
		Total	400		X^2= 42.161
					p< .005

[a]U.A.= U. affinis; U.Q.= U. quadrifasciata; B.F. = B. fausti.
[b]Symbols indicate presence (+) or absence (-) of each insect.

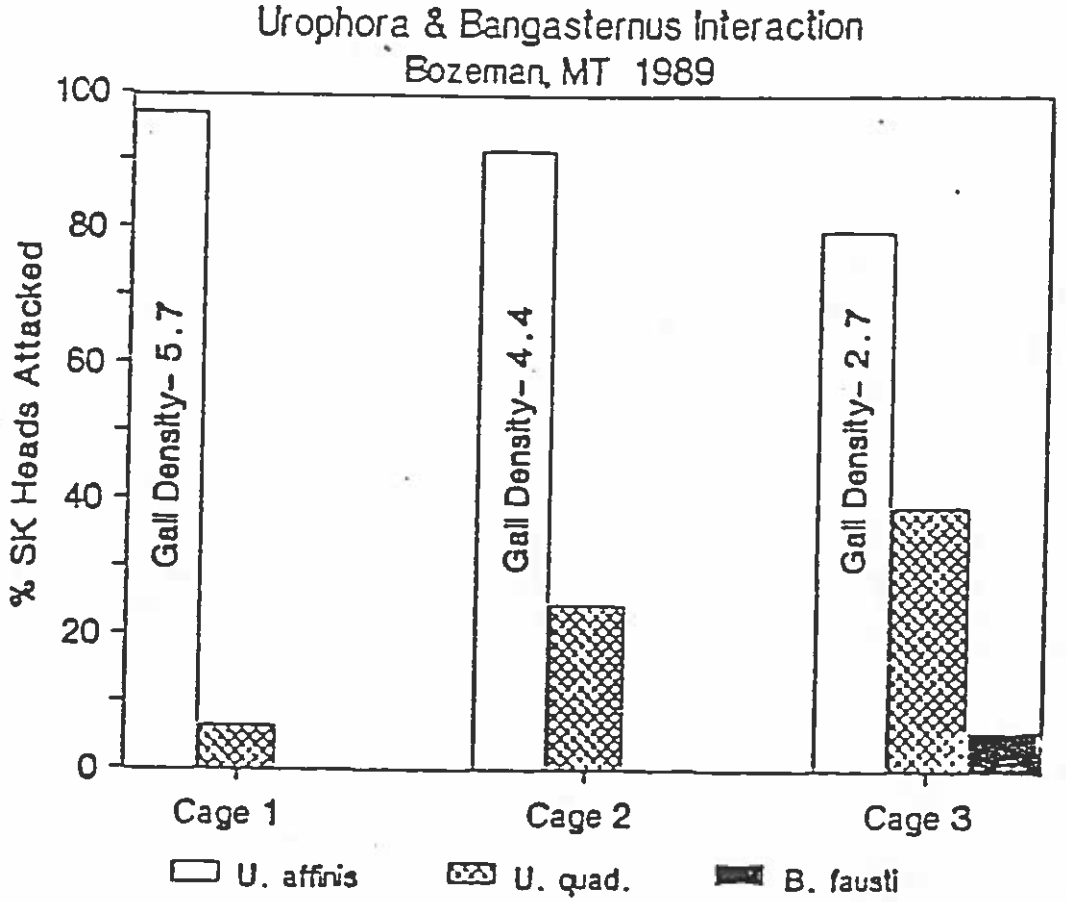

Fig. 1. Comparison of attack rates of SK seed heads exposed to all 3 bioagents. Natural populations of U. affinis and U. quadrafasciata were supplemented with 20 weevils of B. fausti in each cage.