

# Birdsfoot Trefoil Seed Production in Upper Michigan



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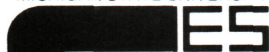
BIRDSFOOT TREFOIL is a perennial forage legume used for pasture and hay, primarily on poorly drained, acid soils not suitable for alfalfa production. It has become an important hay and pasture crop in the north central and eastern United States and in some areas of the far West, where soils are too wet or acid for alfalfa. It is also well adapted for permanent pasture in hilly areas with finely textured soils, such as Miami loams, which are subject to erosion. It is not adapted to droughty, coarse-textured soils such as an Emmet sandy loam because of low productivity.

## Seed Production in Michigan

Excellent potential for seed production of birdsfoot trefoil exists in wide areas of northern Michigan, especially the Upper Peninsula. Areas of wet, poorly drained soils with relatively few cash cropping alternatives make upper Michigan ideally suited for seed production. In this area, seed production has been aided by the cool weather, high relative humidity, and heavy dews which characterize the harvesting season and reduce undue shattering losses which plague other seed production areas.

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## VARIETIES FOR SEED PRODUCTION

Many varieties of birdsfoot trefoil are available, but not all are profitable for seed production in Michigan because of lack of adaptation to Michigan conditions or the lack of a favorable market for seed.

The varieties shown in Table 1 are presently on the certifiable list in Michigan. Tables 2 and 3 provide data on forage yield, seed yield, and winter survival in various midwestern and eastern locations.

It should be noted that different factors, including market demand, may determine profitability of seed

**Table 1 — Characteristics of birdsfoot trefoil varieties evaluated in Michigan.**

Variety	Origin	Plant type	Winterhardiness	Performance	Remarks
Viking	Cornell Univ. public variety	Erect, hay type, earliest maturity	Moderate, generally adequate for Mich. but greater hardiness is desirable	Excellent seedling vigor, good yield performance, good regrowth	Less winter hardy than Empire but adequate for Michigan; good seed production in Michigan
Maitland	Univ. of Guelph, Canada, public variety	Erect, hay type	Moderate, similar to Viking	Similar to Viking, yields slightly less than Viking	Adapted to same conditions as Viking
Norcen	North Central states, public variety, released in 1981	Intermediate, semi-upright, matures later than Viking, earlier than Empire	Moderate to high	Limited information to date in Mich.; looks promising	More winterhardy than Viking in Minnesota trials; high yielding; excellent seed producer
Leo	MacDonald College, Canada, public variety	Intermediate, semi-upright, matures slightly earlier than Empire	Moderate to high	Very good seedling vigor, yields are as good as Viking	Poor seed producer; seed very difficult to obtain
Carroll	Iowa State Univ. proprietary variety	Similar to Empire but more upright, matures earlier than Empire	High	Excellent seedling vigor, yields are as good as or better than Empire	Adapted to same soil conditions as Empire; seed difficult to obtain
Empire	Cornell Univ. public variety	Low growing, fine-stemmed, late maturity	High	Good tolerance to grazing, adapted to wetter soils than Viking	Harder to establish than Viking
Mackinaw	Soil Conservation Service, USDA, public variety	Low growing, fine-stemmed, late maturity	High	Slightly better seedling vigor than Empire, yield similar to Empire	Adapted to same soil conditions as Empire
Dawn	Univ. of Missouri proprietary variety	Semi-upright growth	Moderate to high	Similar to Empire, produces well in Michigan	Marketed by North American Plant Breeders
Fergus	Univ. of Kentucky proprietary variety	Semi-prostrate growth	Appears adequate for seed production. May not be hardy enough for forage	Seed production appears promising; Probably not adequate for forage production	Marketed by North American Plant Breeders
Georgia 1	Univ. of Georgia	Erect type growth	Appears adequate for seed production. May not be hardy enough for forage	Seed production appears promising; Probably not adapted for forage production	Not released as of 1983

**Table 2—Yield in tons of hay per acre, 12% moisture, of trefoil varieties in Michigan and in the central and eastern United States.**

Variety	Michigan					Other states					
	East Lansing (6)*	Lake City (6)	East Lansing (1)	Chatham (6)	Chatham (1)	Ill (3)	Io (1)	Mo (1)	Mn (1)	NY (3)	Pa (1)
Norcen	--	--	6.2	--	4.1	5.0	0.6	3.9	3.1	4.0	--
Carrroll	3.9	3.1	6.1	3.1	3.7	4.6	0.7	3.1	3.4	3.6	4.6
Leo	3.9	3.4	6.7	3.4	3.8	4.7	0.6	3.5	3.4	3.7	4.8
Empire	3.6	2.7	5.2	2.7	3.4	4.8	0.5	2.6	2.9	3.4	4.3
Viking	4.0	3.3	6.5	3.3	3.8	4.6	0.5	2.6	2.4	3.8	4.4
Dawn	--	--	6.0	--	3.4	4.6	0.6	3.1	3.2	3.5	4.6
Fergus	--	--	6.4	--	4.4	--	--	--	--	3.7	5.0

\*Numbers in parentheses indicate number of location years on which data were collected.

production of a particular variety. Thus, Viking remains the most popular variety in northern Michigan because of its reputation and marketability, particularly in the northeastern states, although other varieties such as Norcen show similar promise.

### Land Selection

Proper selection of land is very important in producing seed of birdsfoot trefoil. Best sites for establishing seed fields are those which have been in small grains or row crops. **For producing certified seed, land must not have grown birdsfoot trefoil for a minimum of two years prior to the year of seeding. Fields for producing certified seed must also be isolated at least 165 feet from potential sources of outcrossing.** This includes other varieties, uncertified trefoil, or even wild populations along roadsides or fence rows.

### Land Preparation and Field Establishment

See Extension Bulletin E-1536, "Growing Birdsfoot Trefoil in Michigan," June 1981, pages 6 and 7, for a complete coverage of this topic.

### Weed Control in Established Stands

Weed control in birdsfoot trefoil is important for producing high seed yields. In a ten-year New York study, seed yields were increased from an average of 70 to 121 lb per acre by control versus no grass control (Table 4).

To control weeds, several practices may be followed. Select fields free of important weeds known to damage the birdsfoot trefoil crop. Clean up fields by fallowing or row-cropping in years before seeding birdsfoot trefoil. Cutting the first crop for hay can control broadleaved weeds, but this will reduce seed yields and should not be done later than mid-June. Perennial grasses, particularly quackgrass, which may become established in birdsfoot trefoil fields,

**Table 3 — Winter injury, vigor rating, percent stand and seed yield of trefoil varieties at Roseau, Minn.**

	Winter injury rating*		Seed yield (lbs/ac)	
	May 1979	May 1980	1979	1980
Norcen	1.2	3.0	350	388
Carroll	1.0	2.2	320	463
Leo	1.0	2.7	345	593
Empire	1.7	3.2	230	350
Viking	1.3	4.7	330	--
Dawn	1.7	2.7	350	373
Fergus	2.0	3.7	400	--
Mackinaw	1.3	2.0	220	480
Mo-20	1.0	4.0	305	--
Cascade	2.0	4.7	300	--
Kalo	2.0	4.8	240	--
Vega 11	3.5	4.8	140	--
Mansfield	2.1	5.0	340	--

\*1 is least and 5 is most injury.

**Table 4 — Influence of grass and weeds upon seed yields in pounds per acre of birdsfoot trefoil in New York.\***

Year	Seeded with timothy	Seeded alone**
1	75	119
2	126	135
3	150	143
4	100	123
5	57	120
6	25	95
7	69	140
8	33	120
9	40	98
10	26	116
Mean yield for 10 years	70	121

\*Data taken from *Birdsfoot Trefoil Seed Production*, H. A. MacDonald and J. E. Winch, Dept. of Agronomy, Cornell Univ. Mimeo No. 57-18, February 1957.

\*\*Field kept free of weeds and grass growth.

can be controlled by spraying 3 lb of Kerb 50-W powder per acre between mid-October and late fall, when the soil temperature is below 50°F. Kerb can be applied on snow prior to ground freeze-up. Future possibilities for perennial grass control include new post-emergence herbicides such as Poast® and Fusilade.® Growers should consult Extension agents about labeling of these herbicides for use in trefoil.

Infestation of birdsfoot trefoil fields by volunteer red clover or alsike clover not only reduces stands and seed yields but results in clover seed contamination in the harvested seed lot. Since clovers are short-lived (generally two years), such infestations are normally most severe the first two years.

Although dalapon (Dowpon M®) is registered for control of red clover and alsike clover in birdsfoot trefoil seed fields, it is best to avoid planting trefoil in fields having a high potential for volunteer clover contamination. Red and alsike clovers can be controlled during the establishment year by applying 6 lb TCA (A.E.) pre-emergence followed by 10 lb Dowpon M® post-emergence when clovers are 2 to 4 inches tall. This treatment will also suppress grasses. Volunteer clover plants can also be controlled by applying Dowpon M® at the rate of 3.75 lb per acre in August or September of the seeding year or after the seeding year when the clover plants are 3 to 6 inches tall. Dalapon does not injure the trefoil if applied at the correct stage of growth. It selectively prevents most of the red clover and alsike clover from producing seed, thus eliminating the excessive clover from the harvested new crop.

Fields sprayed with dalapon should be carefully observed for clover control. If flowering and seed set

occurs, remove the clover plants by hand roguing. **Registration for dalapon is only for use in trefoil seed fields. No hay or crop residue from sprayed fields may be fed or used as bedding for animals during the crop year of application.**

### Insect Control

**Tarnished plant bugs** (also called Lygus bug) and, to a lesser extent, **alfalfa plant bugs** suck the sap and lower the vigor of trefoil. More importantly, they inject a toxic saliva into the plants that causes the flowers and small pods to drop.

The tarnished plant bug adult has wings, is oval, is about ¼ inch long, has long antenna (feelers), varies in color from greyish to brown, and usually has a yellow V-shaped mark in the center of its back.

The alfalfa plant bug is similar, but is more elongate, greyish to greenish, and lacks the V-shaped mark. Their young (called nymphs) are similar to the adults but lack wings and are greenish in color. Check the fields for these bugs every few days from the time that the first flowers appear until most of the pods have set. A spray of insecticide (see Table 5) is recommended when 1 or more bugs are seen per plant.

**Potato leafhopper** also sucks the sap and injects a toxic saliva into the plant. The damage appears as stunted plants with cupped (curled downward and inward) leaves that may be yellow or reddened. The leafhoppers show up in trefoil in late June and can damage trefoil until it is in the brown pod stage.

The leafhopper adult is winged, spindle-shaped, about ⅛ inch long, has short antennae, and is pale green in color. Their nymphs are wingless, but otherwise resemble the adults. The adults fly readily when

**Table 5 — Insecticides for control of insects in seed fields of birdsfoot trefoil.**

<i>Insect</i>	<i>Insecticide</i>	<i>Pounds Active per acre</i>	<i>Limits*</i>
Tarnished plant bug	Dylox or Proxol	1.0	0 days
	malathion	1.25	0 days
	M & M**	3 quarts formulation	0 days
Potato leafhopper	Dylox or Proxol	0.5	0 days
	malathion	1.25	0 days
	methoxychlor	1.0	7 days
	M & M	2 quarts formulation	0 days
Grasshoppers	malathion	1.25	0 day
	Seven 5% bait	30 pounds bait	0 days
	M & M	2 quarrts formulation	0 days
Armyworm	Dylox or Proxol	1.0	0 days
	malathion	1.25	0 days
	Sevin 5% bait	30 pounds bait	0 days
	methoxychlor	1.5	7 days
Pea aphid	malathion	1.25	0 days
	M & M	2 quarts formulation	0 days
Meadow spittlebug	malathion	1.25	0 days
	methoxychlor	1.0	7 days
	M & M	2 quarts formulation	0 days

\*Minimum days between application and harvest or grazing.

\*\*M & M is a mixture of malathion and methoxychlor that is sold under a number of trade names.

disturbed, and both adults and nymphs tend to run sideways. They feed from the veins on the underside of the leaves.

Watch for the adults flying ahead of you as you walk through the field and look under the leaves for the hoppers. An insecticide is recommended when 1 or more leafhoppers are seen on most of the leaves.

The well-known **grasshoppers and armyworms** occasionally damage trefoil. Watch especially closely for armyworm in trefoil fields bordered by grasses or small grains and for grasshoppers in fields next to open grassy areas since these pests build up in such areas and move into the trefoil. If possible, control these pests in the adjacent fields before they move into the trefoil. Both pests chew the leaves of the plants, and trefoil can tolerate considerable leaf loss without reduction in seed yield.

A spray of insecticide should be applied when there are 8 (small plants) to 16 (large plants) grasshoppers per square yard or 4 or more armyworms per row-foot. These insects are often found in damaging numbers only in areas of a field—usually in margins and headlands. Treat only the infested area and a 20-ft border around it if only a section of the field is infested.

**Pea aphid and meadow spittlebug** are sometimes common early in the season in trefoil. They may be damaging in some fields, and you should check for them in the small plants. Pea aphids are small, soft, round, green, relatively inactive insects that are found in compact groups (called colonies) on the stems and leaves. They suck the sap, and when abundant, they stunt the plant, causing a curling and mottling of the leaves. Trefoil will tolerate some aphids, and a spray of insecticide is recommended only when a colony of aphids is found on nearly every stem.

Meadow spittlebug nymphs are plump, yellowish, slow-moving insects that suck sap from the plants from within the protection of a spittle mass that they form around themselves on the stems. Adults (called frog hoppers) are winged, about ¼-inch long, broadly oval, have short antennae, and vary widely in color from light grey, greenish, reddish, to black. The adults jump with a popping sound and are present on many plants from mid-June to the first frosts. The spittle masses can always be found in trefoil early in the season, and a spray of insecticide is recommended only when there are 1 or more spittle masses per stem.

**Fruittree leafroller** (a pest of many crops in spite of its name) is a yellowish to greenish caterpillar with a brownish head. It is cylindrical, has six small legs just behind its head, a series of fleshy legs near its rear, and is about ¾ inch long when fully grown. It spins webs that often fold and tie the leaves and flowers together and chews the leaves within the protection of the webs. The leafroller has been common in some trefoil fields during July, but we

still have no estimate of its damage to the yield. Contact your County Extension Agent if you find leafrollers in any numbers in your crop.

## Insecticides and Bees

**Honey bees** are needed for pollination of trefoil and are, unfortunately, readily killed by most insecticides. The insecticides recommended in Table 5 are effective against the pest insects and will cause a minimum kill of honey bees. Special precautions should be taken to protect honey bees even when these selected insecticides are used:

1. Check your fields especially carefully at first bloom and treat for the insect if needed. Spraying of insecticides should be done when there are few flowers and a minimum number of honey bees are in the field.
2. Control grasshoppers or armyworms in the adjacent fields before they move into the trefoil field. Use a bait to control these insects in the trefoil. The insecticide Sevin is extremely toxic to bees when used as a spray, but has minimal effect when used as a bait.
3. Apply insecticides in the evening to avoid directly spraying the bees that are working in the field.

## Harvesting

The crop may be combined or swathed (or windrowed) and then threshed. Threshing from a wind row or swath can give a 50% better yield than direct combining. The extra expense is usually worth the extra income derived from the seed. Direct combining is a slow and exacting process, since the trefoil plants are still green. If the crop is windrowed, it should be done early in the day when the crop is tough—preferably covered with a heavy dew. Combining from a windrow should be done as soon as the crop will go through a combine, usually well in advance of complete drying of the stems. Each hour's delay will increase shattering losses, particularly on sunny days.

**Table 6 — Influence of bees on seed yield of birds-foot trefoil.\***

Treatment	Yield of seed** lb/acre
No bees . . . . .	0
Open field (local bees) . . . . .	47
Bees in field, one colony per acre . . . . .	96
Bees caged with crop . . . . .	106

\*These yield levels should not be considered as representative of expected yields under normal field conditions, but represent relative yields under experimental conditions representing different bee populations.

\*\*From: MacDonald, H. A. and J. E. West, Department of Agronomy, New York State Department of Agriculture, Cornell University.

## Drying the Seed

Because of the relative maturity of trefoil seed at any given time, seed harvested in August or September will probably need drying in order to avoid heating and preserve viability. Seed harvested in October will be more mature and is less likely to require drying. Drying will be aided if the seed is rough-cleaned to remove coarse and green material.

Drying can best be accomplished for large quantities of seed in a batch dryer by passing dry air through the seed at depths of 8 to 10 inches. Smaller amounts of seed can be dried by spreading the seed on a dry floor, on a plastic sheet, to a depth of 3 or 4 inches and turning daily.

If seed heats, the germination will likely be lowered. If heating is excessive, germination may be below 80%, which is the minimum for certified seed.

## Cleaning

Basic cleaning of trefoil seed should be done on an air-screen-machine (fanning mill). Depending on the

kind of contaminants remaining, the seed may need to be cleaned further by specialized processing equipment, such as a gravity mill, indent disk, or buckhorn machine. Normally, trefoil seed growers would not have this equipment, so final processing would be done by the wholesaler purchasing the seed.

Trefoil seed grown for certification in Michigan must meet the standards shown in Table 7.

**Table 7 — Michigan standards for certified birdsfoot trefoil seed.**

Pure seed content	.98.00%	Dock, sorrel and restricted	
Inert matter	2.00%	noxious weed seeds 45/lb	
Weed seeds	0.20%	Sweet clover seeds... 45/lb	
Other crop seeds	0.20%	Germination	80.00%
Prohibited noxious weed seeds	None	Germination minus hard seed content	45.00%
Seeds of other varieties	1.00%		

## PAST AND PRESENT CERTIFIED SEED PRODUCTION PROGRAM

### Historical Review (1949-1977)

The first trials of birdsfoot trefoil in northern Michigan were in 1949 when one-acre plots of Empire were established in Mackinac and Chippewa counties. In 1950, the Department of Farm Crops of Michigan State University and Soil Conservation Service arranged for the establishment of small plots of several forage species. From these plots, it was determined that trefoil had potential as an important forage in northern Michigan.

In 1953, Professor Boyd R. Churchill and Dr. M. B. Tesar (in the Farm Crops Department, now the Department of Crop and Soil Sciences) determined, in an experiment at the County Farm four miles south of Sault Ste. Marie, that quackgrass must be controlled, preferably by a herbicide, if adequate stands are to be obtained on a heavily infested quackgrass site. The first successful plantings in the western U.P. were two 1-acre plots established in Ontonogon County in 1958.

Trefoil seed production was initiated in 1956-57 when Dr. Tesar arranged for a meeting with Russell Billings of Stanford Seed Co., Buffalo, N.Y.; R. S. Apfelbaum of the Seaboard Seed Co., Philadelphia, PA; and Karl Larsen, County Extension Director, Chippewa County, MSU Cooperative Extension Service. Under arrangements worked out at this meeting, a total of 105 acres of certified Viking birdsfoot trefoil was established under contract on nine different farms in Chippewa County in 1957 and an additional 130 acres in 1958. Yields ranged up to 220

lb of clean seed per acre with an average yield of 120 lb per acre. Similar yields were obtained in 1959 and 1960, but successively less acreage was harvested, and the program of certified seed production was discontinued.

The failure of the first certified trefoil seed production program can be attributed to four factors: (1) without annual application of Dalapon to control contamination by volunteer red clover, the crop usually did not meet certification requirements because of excessive contamination by red clover in the harvested seed; (2) most of the growers were dairy farmers; (3) dalapon-treated straw could not legally be fed to lactating dairy animals; and (4) the temptation for the grower to violate the contract by selling uncertified seed locally.

In spite of the failure of the certified seed program, production of uncertified seed was, and continues to be, an unqualified success. This is due to the excellent adaptation of trefoil to Upper Peninsula soil and climatic conditions and because of the lack of adaptation of alfalfa to wet soils. Because of these factors, birdsfoot trefoil has firmly established itself as the dominant forage legume in many areas of the Upper Peninsula, and a vigorous industry of uncertified seed has evolved. This production has supplied seed locally to expand acreage in northern Michigan and provide for wholesale merchandising of out-of-state markets, particularly New York and other northeastern states.

## The Current Program (Since 1978)

The northern Michigan certified birdsfoot trefoil seed production program was reinitiated during the summer of 1977 when M. B. Tesar indicated the need for certified seed of Viking birdsfoot trefoil in New York, and the desire of the New York seed industry to develop new seed sources. Dr. Tesar recounted the success of initial introduction of trefoil into the Upper Peninsula in the mid-1950's, its excellent adaptation to northern Michigan, and its present importance as a forage legume in the Upper Peninsula dairy and beef industry. As a result of this discussion, Russ Billings, Stanford Seed Co., was again contacted about interest in re-establishing seed production contracts in northern Michigan. Mr. Billings and other representatives of the N.Y. seed industry were invited to the Upper Peninsula for a fact-finding and evaluation trip and to discuss the possibility of re-establishing seed production contracts in northern Michigan.

An arrangement was made with Michigan State Seed Co., of Grand Ledge to develop contracts with northern Michigan trefoil growers to produce certified seed of Viking, the dominant trefoil variety in both New York and Michigan. The contracts stipulate a price to the grower of \$.25/lb above the world market price on a clean seed basis, with a minimum price of \$1.25 per lb. In addition, the foundation seed and all certification fees are provided without charge to the grower.

The first fields under this program were harvested in 1979, producing over 12,000 lb of certified seed from nearly 300 acres. At \$2.45/lb this resulted in almost \$30,000 of new income to northern Michigan's agriculture.

During the next two years, two other varieties, Dawn and Fergus, were brought into the program on behalf of North American Plant Breeders who also employed Michigan State Seed Co. as their marketing agent. The first seed of these two varieties was produced in 1982.

Table 8 shows the total production of seed (certi-

fied and uncertified) from fields, planted under the revived certification program in terms of acreage, total seed produced, varieties being produced and the income generated. The growth in number of varieties is of special significance. It indicates developing confidence among the seed industry in the value of Michigan as a seed producing area. It also indicates the Michigan seed producers' confidence in trefoil as a profitable crop for northern Michigan.

Table 9 shows the quality of harvested seed following cleaning. Significant improvement in seed quality has occurred from 1979 to 1980. This is reflected by several indices, especially percent pure seed. The single most critical index of quality, and the one causing most failures to qualify for certification, is percent other crop seed, which must be 0.20 percent or less (see Table 7). When this factor is compared with information on incidental contamination, it is clear that most failures occur because of excessive red clover, alsike clover or white clover. These species, particularly red clover, have seeds somewhat similar in size and shape to trefoil and cannot be completely removed during cleaning.

Almost \$200,000 has been generated by Upper Peninsula seed growers since 1979 (see Table 8) from seed production under the revived certified seed production program. In addition, the technology and know-how generated by this program has influenced uncertified production as well. It is estimated that this project is directly responsible for as much as \$600,000 to the northern Michigan economy over the past four years.

Michigan's relative rank in certified trefoil production in both the United States and North America is illustrated by Table 10. More than 50 percent of the entire U.S. production was grown in Michigan in 1982. Almost 13 percent of the entire North American production is in Michigan. Based on its growth from 1977 and growing reputation, its relative rank is expected to increase in the next 5 to 10 years.

**Table 8 — Production of Certified Birdsfoot Trefoil Seed in Northern Michigan—1979-82.**

Year	Variety	Acres	Production (lb) not meeting certification standards	Production (lb) certified	Production upgraded to certification standards	Total production (lb) certified	Grower price (lb)	Total income generated
1979	Viking	320	3,570	7,000	2,230	9,450	\$2.45	\$23,152
1980	Viking	1310	---	9,700	---	8,700	2.75	23,925
1981	Viking	860	---	7,900	7,590	15,500	1.40	21,700
1982	Viking	750	2,000	57,000	3,000	60,000	1.75	105,000
	Dawn	125	---	10,930	---	10,930	1.75	19,127
	Fergus	70	323	3,750	---	3,750	1.75	6,562
	Total (1982)	945						130,689
	Total		5,893	95,280	12,820	108,330	---	199,466

**Table 9 — Overview of seed quality from Northern Michigan Certified Birdsfoot Trefoil Seed Production Program in 1979 (14 lots), 1980 (5 lots), 1981 (39 lots) and 1982 (24 lots).**

Quality factor	1979		1980		1981		1982	
Pure seed . . . . .	94.47		94.73		98.62		99.79	
Inert matter . . . . .	0.07		0.04		0.04		0.03	
Weed seed . . . . .	0.67		0.05		0.08		0.0005	
Other crop seed . . . . .	0.91		0.18		0.26		0.18	
Germination percent . . . . .	66		65		61		62	
Hard seed . . . . .	26		17		25		30	
Total germination . . . . .	92		82		86		92	
	Percent of lots contaminated	Average contamination in seeds/lb	Percent of lots contaminated	Average contamination in seeds/lb	Percent of lots contaminated	Average contamination in seeds/lb	Percent of lots contaminated	Average contamination in seeds/lb
<i>Other crop seed; Weed seed</i>								
Red clover . . . . .	100	820	100	418	69	3,949	50	646
Alsike clover . . . . .	93	998	50	48	2.5	312	25	700
White clover . . . . .	64	106	--	--	7.6	150	4	300
Timothy . . . . .	29	30	25	14	24	322	21	293
Alfalfa . . . . .	--	21	--	--	5.1	150	4	300
Bird rape . . . . .	--	--	--	--	3.5	300	--	--
Black medic . . . . .	50	340	50	69	18	200	--	--
Sweet clover . . . . .	71	224	--	--	--	--	--	--
Crownvetch . . . . .	--	--	25	14	--	--	--	--
Catchfly . . . . .	31	23	50	14	10	825	--	--
Buckhorn plantain . . . . .	29	54	25	14	7.6	650	--	--
Carolina geranium . . . . .	--	--	75	280	2.5	450	--	--
Curly dock . . . . .	--	--	--	--	18	--	--	--
Self heal . . . . .	--	--	--	--	--	--	--	--
Sorrel . . . . .	36	64	--	--	--	--	4	150
Green foxtail . . . . .	7	14	--	--	2.5	1,500	--	--
Chickweed . . . . .	7	131	--	--	--	--	4	300
Lambsquarters . . . . .	7	--	--	--	--	--	--	--
White cockle . . . . .	57	55	--	--	--	--	--	--
Wild mustard . . . . .	29	22	--	--	--	--	--	--
Field Peppergrass . . . . .	29	25	--	--	2.5	150	--	--
Oxeye Daisy . . . . .	7	14	--	--	--	--	--	--
Lady's thumb . . . . .	7	27	--	--	--	--	--	--
Percent meeting Cert. Stds.	43				36		83	
Percent upgraded to Cert.	39				0		6	
Total percent Cert.	82				36		83	

**Table 10 — Total Production (acres) of Certified Birdsfoot Trefoil Seed Production—1982.**

Variety	Mich.	N.Y.	Wisc.	Minn.	Mont.	Total U.S.	Total Canada	Total N. America
Dawn	125	--	--	--	--	125	--	125
Empire	--	66	3	--	--	96	1987	2083
Fergus	68	--	--	--	--	68	--	68
Leo	--	--	--	14	--	14	1742	1756
Mackinaw	3	--	--	--	--	3	--	3
Norcen	--	--	5	45	--	48	--	50
Tretana	--	--	--	--	122	--	--	12
Viking	564	343	70	--	--	1089	184	1161
Proprietary	--	--	--	--	--	--	149	149
<b>Total</b>	<b>760</b>	<b>409</b>	<b>105</b>	<b>59</b>	<b>12</b>	<b>1345</b>	<b>4062</b>	<b>5407</b>
Percent of Total U.S. production	56	30	8	4	2	25		

Source-Report of Acres applied for certification. 1982. Association of Official Seed Certifying Agencies.