

Distribution and Rate of Spread of Scentless Chamomile on the  
Black and Gray Soils in Saskatchewan.

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ABSTRACT

In 1987 a questionnaire survey was conducted to determine the distribution of the noxious weed scentless chamomile on the black and gray soils of Saskatchewan. As well information was obtained on the year of first sighting, habitats affected, farmers' perception of the problem, the percentage of their land affected, and methods used to control or manage the weed. A total of 29,666 questionnaires were distributed, of which 2120 (7.1%) usable responses were returned. Of these, 35.6% indicated that scentless chamomile occurred on land they farmed or on adjacent roadsides. In the group which reported occurrence the most common habitat, reported by 69.5%, was the roadside. Annual crops were reported as scentless chamomile habitats by 30.0% and wet areas of fields, which can sometimes be cropped, by 39.0%. The most common methods reported for control of the weed were tillage, handweeding and herbicide use. Of the 214 farmers who indicated herbicide use, 26.2% used herbicides containing bromoxynil, 16.4% used herbicides containing dicamba and 15.4% used glyphosate. Spread of the weed has increased rapidly in the last 20 years. Of the responses to year of first sighting 19.0% were between 1968 and 1977, and 69.0% reported first sighting the weed within the last decade.

INTRODUCTION

The weed scentless chamomile (Matricaria perforata Mérat) was declared noxious in Saskatchewan in 1977. Pressure from concerned farmers, especially from those in the east-central part of the province, was instrumental in this process. They were concerned that a weed for which there was not adequate chemical control was spreading at a rapid rate.

Scentless chamomile is a showy weed when mature. It has a daisy-like flower, with white petals and bright yellow disc florets, which it produces in great number. The leaves are delicate and finely-dissected. Individual freegrowing plants can be 80 cm tall and occupy an area having a similar diameter. This weed can exist as an annual, a winter annual, a biennial or as a short-lived perennial. It is primarily spread by movement of seed, of which

it is a prolific producer. Some limited spread can occur when whole plants are translocated on machinery. The plant has a large system of fine roots which, if sufficient moisture is present, can hold enough soil to support it through such transplantation and allow it to re-establish.

A research project began in 1985 at the Agriculture Canada Regina Research Station to provide the background information necessary for the development of an integrated program of cultural, chemical and biological control. An important part of the research is determining where the weed occurs. This investigation has two aspects. The first is to establish the geographical distribution of the weed in the province. This would show us whether we are dealing with a localized or with a widespread problem. Secondly, the habitats affected by scentless chamomile must be determined in order to evaluate the applicability of potential control measures.

In this paper we will present the results of a survey conducted to determine these distributions.

#### MATERIALS AND METHODS

Previous records of occurrence of scentless chamomile in Saskatchewan were concentrated in the black and gray soils. We thus directed our resources toward further investigation of these areas (Figure 1A).

We felt that the most effective method of surveying the very large areas involved was to ask those most familiar with the land - the farmers themselves. A questionnaire package was prepared, consisting of the questionnaire, a description and colour picture of the weed and a postage-paid return envelope. The questionnaire was short and straightforward. Our hope was that this format and the postage-paid envelope would encourage farmers to respond. Packages were mailed in the last week of July, timed to arrive when the weed would be conspicuously in bloom and before farmers became wholly occupied with harvest.

Topics covered by the questionnaire included presence or absence of the weed, year of first sighting, habitats, a weed problem rating, percentage of land affected and control measures attempted. Included as well was a request for specific quarter-sections affected. This information, with the year of initial infestation, was used to map the distribution of the weed through time in order to illustrate the rate of spread.

An initial estimate of the number of farmers to be surveyed was determined from information provided by Canada Post Corporation through its Admail service. The information consisted of lists of Saskatchewan post offices and the number of farm households served by each. Post offices in our study area were located and the number of farm households served totalled. We were constrained by our budget to surveying approximately 30,000 farmers in 1987. In 1988 we will complete the area, surveying an additional 10,000 farmers.

The data was analysed using various procedures of the Statistical Analysis Systems (SAS) software package.

## RESULTS AND DISCUSSION

### 1. Questionnaire survey

We received 2120 usable questionnaire responses, a rate of return of 7.1%.

A slight majority (35.6%) of the farmers who responded said that the weed was present on land they farmed or on the adjacent roadsides (Table 1). Negative responses were received from 34.1%. The remainder indicated that they were not sure if the weed occurred on or adjacent to their land. This group was composed of those who knew the weed but were not sure of its occurrence, and those who were not familiar enough with scentless chamomile to be able to make a positive identification.

Table 1: Presence of scentless chamomile on land farmed or on adjacent roadsides

Response	Number	Percent
Present	754	35.6
Not present	723	34.1
Not sure	643	30.3

Total number of responses = 2120

Responses to year of first sighting were given by 710 farmers (Table 2). Of these, 88.0% reported first seeing the weed on their land within the last 20 years and 69.0% within the past decade. The pattern of increase through time illustrated in Table 2 conforms to that reported by Salisbury (1961) and by Forcella (1985) for introduced weed species. They discussed the phenomenon of a long period of slow increase after introduction, followed by a relatively abrupt shift to rapid expansion. The responses to the survey indicate a lag of approximately 50 years between the first report of scentless chamomile and the rapid expansion phase.

Table 2: Year scentless chamomile was first sighted on land farmed or on adjacent roadsides

Response	Number	Percent
1905 - 1917	2	0.3
1918 - 1927	5	0.7
1928 - 1937	5	0.7
1938 - 1947	8	1.1
1948 - 1957	15	2.1
1958 - 1967	50	7.0
1968 - 1977	135	19.0
1978 - 1987	490	69.0

Total number of responses = 710

Table 3: Most commonly reported scentless chamomile habitats

Response	Number	Percent
Roadsides	523	69.5
Farmyard and buildings	429	57.0
Fences,lanes,powerlines	335	44.5
Wet areas, sometimes cropped	294	39.0
Annual crops	226	30.0
Permanent sloughs, never cropped	192	25.5
Pasture (seeded and native)	188	25.0
Other habitats	367	48.3

Total number of responses = 753

The three most commonly reported habitats of scentless chamomile were roadsides, farmyards and buildings, and fences,lanes and powerlines (Table 3). These are all nonagricultural land. Numerous farmers commented that roadsides, where no active control measures are undertaken, provide a seed source for continued infestation. The fourth and fifth most common habitats, wet areas which are sometimes cropped and annual crops, are both agriculturally important areas.

The reported habitats were classified into agricultural and nonagricultural land (Table 4). The agricultural land was further classified into arable and nonarable land. The arable land included annual crop, seeded pasture, perennial forage, wet areas sometimes cropped, winter wheat, summer fallow, fall-seeded crops and land under continuous crop. Native pasture or rangeland and hayland comprised the nonarable category.

Table 4: Agricultural classification of scentless chamomile habitats

Response	Number	Percent
Agricultural land		
Arable	437	58.0
Nonarable	106	14.1
Nonagricultural land	717	95.2

Total number of responses = 753

Almost 40% of those who rated scentless chamomile in comparison with other weeds considered it to be a significant problem or most troublesome (Table 5). The remainder felt it posed little or no problem.

Table 5: Comparative rating of scentless chamomile as weed problem

Response	Number	Percent
Most troublesome	77	10.6
Significant weed problem	210	28.8
Minor weed problem	231	31.7
Not a problem	210	28.8

Total number of responses = 728

Table 6: Association of scentless chamomile with disturbed or undisturbed habitats

Response	Number	Percent
Disturbed habitats	492	69.5
Undisturbed habitats	216	30.5

Total number of responses = 708

Most (69.5%) of those who responded associated scentless chamomile with disturbed habitats (Table 6). This is consistent with observations that scentless chamomile is an excellent colonizer of disturbed ground. Some commented that the weed was especially abundant in the ditches of newly-constructed roads.

The majority (42.2%) of respondents indicated that chamomile occurred on or adjacent to 20% or less of the land they farmed (Table 7). At the opposite end of the scale, scentless chamomile occurred on or adjacent to more than 60% of the land of 20.4% of respondents.

Table 7: Percent of quarter-sections farmed on which scentless chamomile occurred

Response	Number	Percent
1% - 20%	292	42.2
21% - 40%	137	19.8
41% - 60%	122	17.6
61% - 80%	53	7.7
81% - 100%	88	12.7

Total number of responses = 692

The three methods of controlling scentless chamomile most often reported were tillage, hand-weeding and herbicide use (Table 8). The high proportion reporting tillage is not surprising considering the relatively limited spectrum of herbicides available for control. That hand-weeding was reported by an equal number of farmers is more unusual. Comments indicated that this was an option when the weed population was low, but in most cases became unfeasible as the weed density increased. Some reported hand-weeding even at higher

weed densities because they felt it was the only method which gave effective control. This may reflect the level of concern that the farmers have for the weed, and to some extent the degree of their frustration with it.

Table 8: Most commonly reported methods used for control or management of scentless chamomile

Response	Number	Percent
Tillage	218	42.9
Hand-weeding	218	42.9
Herbicides	214	42.1
Swath/mow	93	18.3
Burn	69	13.6
Other methods	48	9.4

Total number of responses = 508

Table 9: Most commonly reported herbicides

Response	Number	Percent
Bromoxynil (alone or mix)	56	26.2
Dicamba (alone or mix)	35	16.4
Glyphosate	33	15.4
Chlorsulfuron	13	6.1
Clopyralid	11	5.1
Picloram	5	2.3
Not specified	60	28.0

Total number of responses = 214

Bromoxynil herbicides, which are recommended for control of scentless chamomile seedlings, were the most commonly reported (Table 9). Glyphosate, used by 15.4% of respondents, is often applied as a spot control.

## 2. Distribution of scentless chamomile on the Black and Gray soils of Saskatchewan

The distribution maps are based on 1270 reported locations in a total of 379 townships.

The earliest record of scentless chamomile reported in the survey was 1905 and occurred in the Stockholm-Esterhazy area. Reports of the weed from the following 20 years (Figure 1B) were confined to seven adjoining townships in the immediate area (two of the dots overlap fractional townships).

The weed was reported in four more townships in this area from 1926 to 1940. It also appeared in the vicinities of Wynyard, Humboldt, Melfort, Rosthern, Glaslyn and St. Walburg (Figure 1C).



Figure 1 Scentless chamomile on the Black and Gray soils of Saskatchewan (1905 to 1987). Each dot represents a township from which there was at least one reported occurrence of scentless chamomile.

The weed was not sighted in additional townships in the Stockholm-Esterhazy area between 1941 and 1955 (Figure 1D). Of the other areas mentioned above, only around Wynyard was scentless chamomile reported in new townships, increasing to six the number of townships in which the weed occurred. Farmers reported seeing the weed for the first time near Annaheim, Canwood and Hafford.

In the vicinities of Esterhazy, Wynyard and St. Walburg the number of townships from which scentless chamomile was reported increased considerably in the period 1956 to 1970. The weed was also reported from a greater number of townships located between the three centres mentioned above (Figure 1E).

Townships in which first sightings have occurred within the past 17 years form an almost continuous band through the black and gray soil areas (Figure 1F). Major areas of increase were Esterhazy, Wynyard, Tisdale-Nipawin, Canwood-Shellbrook, Hafford and St. Walburg.

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