

Soil Conservation Attitudes and Practices Among Saskatchewan Farmers¹

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During the past few years, environmental protection and resource conservation have become important goals of society. Concomitant with this is an interest in ensuring that our agricultural production systems are both sustainable, and having minimal negative impacts on the environment. As research and extension personnel initiate programs to assist in soil conservation and sustainable agriculture, it is necessary to have a good idea of what the commonly held attitudes are among farmers, and some statistics about current management practices. To this end, we initiated a survey of Saskatchewan farmers.

MATERIALS AND METHODS

Two groups of farmers were surveyed. The entire membership of the Saskatchewan Soil Conservation Association was used as a convenient sample (CS). A random sample (RS) of 1350 farmers from Saskatchewan Wheat Pool membership formed the second sample. By sampling only in selected Sub Districts that were entirely within soil zones, equal numbers were selected from the Brown, Dark Brown and Black Soil Zones. The survey was sent out in February 1989.

A three-contact method was used to survey the CS. The initial mailing consisted of the questionnaire, accompanied by a cover letter and a postage-paid return envelope. A reminder card was sent out ten days after the initial mailing. Twenty-one days after the initial mailing, a second appeal went out to those who had not yet responded. This mailing consisted of another copy of the same questionnaire, a cover letter asking for cooperation, and a postage-paid envelope. This method obtained a total return of 89% of the questionnaires (Table 1).

The mailing to the RS sample involved a two-contact method. The initial mailing of questionnaire was accompanied by a cover letter and a postage-paid return envelope. Two weeks after the initial mailing, a reminder card was sent requesting the completion and return of the questionnaire. This method obtained a total return of 37% of the questionnaires sent out. Of these, 92% were active farmers.

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Several questions had multiple parts. Responses to these were ranked by mean response. Differences were checked for significance using the Chi-square statistic at $P=0.01$.

Respondents were similar in age, education, farm size, business arrangement, and debt to other recent surveys (Anonymous, 1986; Brown et al, 1989).

Table 1. Numbers of surveys mailed out and numbers and percentages returned.

| Sample | Soil Zone | Mailed | Returned | Returned |
|--------|------------|---------------------|----------|----------|
| | | ----- Numbers ----- | ----- | % |
| CS | | 177 | 159 | 89 |
| RS | | | | |
| | Brown | 450 | 151 | 34 |
| | Dark Brown | 450 | 146 | 32 |
| | Black | 450 | 161 | 36 |
| | | 1527 | 617 | 40 |

It should be drawn to the attention of the reader that there is a strong relationship between age and level of education among Saskatchewan farmers (Table 2). Some of the results are presented according to level of education; this was done since there was a stronger relationship to education level than to age.

Table 2. Relationship between age and education level of survey respondents

| Education | Age (Years) | | | |
|------------------------------|-------------------------------|-------|-------|-----|
| | <35 | 35-44 | 45-54 | >54 |
| | ----- percentage by age ----- | | | |
| Elementary or Junior High | 3 | 10 | 28 | 51 |
| High School | 56 | 48 | 45 | 34 |
| Agriculture or Tech. Diploma | 26 | 25 | 15 | 8 |
| University Degree | 14 | 17 | 12 | 8 |

RESULTS AND DISCUSSION

There was a significant interaction between education level and expectation of effect of conservation farming practices on net profit (Table 3). Almost one half of the least educated group did not know what effect these practices would have. More education generally led to more positive expectations, with the exception of those respondents with agriculture or technical diplomas. This group had a large percentage that expected net farm income to decline. Positive attitudes were also directly related to farm size (not shown).

Table 3. Relationship between education level and expectation of net income with conservation farming practices

| Expected Income | Education | | | |
|-----------------|-------------------------|-------------|-------------|------------|
| | Elementary | High School | Ag. Diploma | University |
| | ----- % of column ----- | | | |
| Lower | 19 | 18 | 28 | 18 |
| The Same | 14 | 23 | 17 | 35 |
| Higher | 20 | 30 | 38 | 34 |
| Don't Know | 46 | 29 | 19 | 14 |

The percentage of land that farmers fallow is based on many market and environmental considerations. Ten possible inputs in this fallowing decision were evaluated. There were interactions between education level and several of these factors (Table 4). As education level increased, the importance of six of the proposed criteria decreased markedly: 1) land is improved by fallowing; 2) removal of soil nutrients by the crop; 3) risk of drought; 4) regular rotation for management reasons; 5) concern for soil erosion; and 6) crop insurance.

Moisture considerations were ranked very high in the Brown Soil Zone. Respondents in the CS, and those with large farms, were less interested in enhancing the soil nutrient status by fallowing, and more concerned about soil erosion. It should be noted that farmers indicated that government programs and crop insurance were not very influential in the decision to fallow.

Table 4. Relationship between education level and factors in the decision to fallow

| | High Ag/Tech | | | |
|-------------------------------|----------------------------|---------|------------|-----|
| | Elementary School | Diploma | University | |
| | ----- Mean Response* ----- | | | |
| Available moisture at seeding | 4.3 | 4.3 | 4.3 | 4.3 |
| Risk of drought | 4.3 | 4.0 | 3.9 | 3.9 |
| Regularity of rotation | 3.9 | 3.9 | 4.0 | 3.6 |
| Economic (income vs expense) | 3.9 | 3.9 | 3.9 | 3.9 |
| Concern for erosion | 4.0 | 3.9 | 3.9 | 3.8 |
| Removal of soil nutrients | 3.7 | 3.4 | 3.2 | 2.7 |
| Land is improved by fallowing | 3.6 | 3.3 | 2.5 | 2.2 |
| Concern for salinization | 3.2 | 2.2 | 3.2 | 3.2 |
| Crop Insurance | 2.4 | 2.5 | 2.4 | 2.2 |
| Government programs | 2.2 | 2.2 | 2.2 | 2.2 |

*5 = Maximum importance

Certain management problems on individual fields can determine whether a farmer summerfallows that field (Table 5). Insect problems were rated quite highly in the Brown Soil Zone as compared to the Black Soil Zone. It is interesting to note that diseases received a higher mean response in the Brown than in the Dark Brown Soil Zone. As a management factor, the risk of erosion declines from the Brown to the Black Soil Zone. This is perhaps due to concern about severe wind erosion events that most commonly occur in Southwestern Saskatchewan.

Table 5. Specific management problems that may be reason for following a particular field, by soil zone

| | Brown | Dark Brown | Black |
|----------|----------------------------|------------|-------|
| | ----- Mean response* ----- | | |
| Weeds | 4.0 | 4.1 | 4.5 |
| Erosion | 3.6 | 3.5 | 3.2 |
| Salinity | 2.9 | 3.1 | 2.6 |
| Insects | 2.8 | 2.5 | 2.2 |
| Diseases | 2.6 | 2.4 | 2.5 |

* 5 = Maximum importance

When asked to describe their present crop rotation, 59% of respondents used crop-fallow or crop-crop-fallow rotations. Only 4% were in a continuous cropping rotation. Thirty percent of the random sample used an extended, flexible rotation. Among the CS, almost twice that percentage (58%) used such a rotation. Length and flexibility of rotation increased with education, farm size and off-farm income.

In a related question, 20% of respondents claimed to occasionally use perennial forages, 14% to occasionally use legume plowdown, and 18% to occasionally use a partial fallow plus annual cover crop for feed.

When farmers reduce the percentage of land they summerfallow, they must increase the percentage of one or more crops in the rotation. Winter cereals were projected to see the greatest increase in the Brown Soil Zone, while Spring cereals would see increased acreage in the Dark Brown Soil Zone. In the Black Soil Zone, spring cereals, oilseeds and perennial forages were all likely to see increased area. Not surprisingly, respondents from the Brown Soil Zone were more conservative in their predicted increase in area of any crops.

One question in the survey listed 12 possible signs of soil degradation, and asked farmers to indicate how effective these signs would be in identifying soil degradation problems on their farms (Table 6). While these results are not surprising, they may indicate that there is a need for extension information about the less obvious symptoms and effects of soil erosion.

Table 6. Effective signs of soil degradation on the farm, in rank order

| RANK* | |
|-------|---|
| 1) | Blowing dust |
| 2) | Soil accumulating in ditches and fencelines |
| 3) | Topsoil removed down to hardpan |
| 4) | Water-runs in a field |
| 5) | Enlarging saline areas |
| 6) | Soil aggregate breakdown |
| 7) | Crop yield reduction |
| 8) | Some crops will no longer grow |
| 9) | Changes in colour and texture |
| 10) | Reduced water holding capacity |

* 1 is most obvious sign

The survey groups were asked to rate 12 possible reasons for becoming involve in soil conservation, and 12 possible reasons for not becoming involved. The top six in each category are listed in Tables 7 and 8.

Table 7. Important reasons for becoming involved in soil conservation, in rank order

| RANK* | |
|-------|-------------------------------|
| 1 | Controlling erosion |
| 2 | Moisture conservation |
| 3 | Maintenance of organic matter |
| 4 | Increasing net farm profits |
| 5 | Increasing soil fertility |
| 6 | Increasing long-term yield |

* 1 is most important

Reasons for not becoming involve in soil conservation (Table 8) were related to education level. Those respondents with higher education gave lower ratings of importance for most of the factors in question. The cost of equipment declined in importance most dramatically, so it moved to sixth in importance. Lack of government support programs was not significantly related to education level, so it moved up rank, to become the third most important reason not to become involved in soil conservation among those with University education.

Table 8. Important reasons for not becoming involved in soil conservation, in rank order

| RANK* | |
|-------|--|
| 1 | Commodity prices too low |
| 2 | Increased cost of fertilizer and chemicals |
| 3 | Increased cost of equipment |
| 4 | Poor weed control |
| 5 | Lower yields |
| 6 | Insufficient incentive from government |

* 1 is most important

Table 9 lists 12 soil conservation practices and the percentage of respondents who indicated that they had tried and succeeded with each practice. Most respondents had either tried and succeeded with these practices, or had not tried them. Reducing amount of summerfallow, and snowtrapping were the only practices with more than 6% of the survey respondents in the "tried but failed" category. The CS respondents had a higher percentage of successes with most practices than did the RS.

Table 9. Percentages of survey respondents who had tried, tried and failed, or not tried selected conservation practices

| | Tried | | Not Tried |
|---|---------|---------|--------------|
| | Success | Failure | |
| | % | | |
| Retaining more crop residue on surface | 95 | 2 | 3 |
| Using herbicides to reduce tillage | 64 | 6 | 31 |
| Using minimum tillage equipment | 62 | 4 | 34 |
| reducing amount of land summerfallowed | 60 | 26 | 15 |
| Organizing fields crosswise to wind | 49 | 4 | 48 |
| Snow-trapping techniques | 47 | 10 | 43 |
| Seeding marginal land to perennial forage | 38 | 1 | 61 |
| Grassing waterways to prevent gullyng | 32 | 2 | 65 |
| Using legumes in rotation | 31 | 4 | 65 |
| Contour farming across slope | 26 | 5 | 69 |
| Using green manure crops to enhance tilth | 24 | 4 | 72 |
| Planting shelterbelts | 19 | 3 | 78 |

The survey asked respondents how useful eight conservation oriented farm implements would be on their farms. Table 10 lists the responses from the RS. Respondents may have been displaying their wish list in answering this question. Averaged over all soil zones and education levels, better straw and chaff spreading equipment was identified as the most effective addition to an equipment roster. The wide V blade cultivator ranked most important in the Brown Soil Zone, and least important in the Black Soil Zone. Air seeders were identified as the most effective additional equipment in the Black Soil Zone, but least effective in the Brown Soil Zone.

Higher educated respondents ranked no-till drills second and deep tillage cultivators eighth. The deep tillage cultivator and rodweeder slipped to the bottom of the list among the CS, and among larger farm sizes. No-till drills were ranked much higher among the CS.

Air seeders were indicated to be top priority for respondents with over 60% of income from off-farm sources. This group is probably short of time at seeding, and air seeders are known for their ability to quickly seed large areas.

Table 10. Expected effectiveness of selected soil conservation equipment, in rank order (Random Sample)

| RANK* | |
|-------|-----------------------------------|
| 1) | Better straw and chaff spreading |
| 2) | Better sprayer (with wind shield) |
| 3) | Rodweeder |
| 4) | Deep tillage cultivator |
| 5) | Air seeder |
| 6) | Large V blade cultivator |
| 7) | No-till drill |
| 8) | No-till drill with side bander |

* 1 is most effective

A list of possible sources of soil conservation information were evaluated. Results from the RS are listed in Table 11. It must be pointed out that the University of Saskatchewan does not have a large extension program in soil conservation, and relies on government extension agencies to communicate their research findings.

Among the CS, the soil conservation groups were considered the best sources of information, and elevator managers the least popular.

Table 11. Sources of soil conservation information, in rank order (Random Sample)

| RANK* | |
|-------|--|
| 1) | Newspapers and magazines |
| 2) | Local Ag. Rep. |
| 2) | Government agencies |
| 3) | Friends and neighbours |
| 4) | Research or demonstrations in area |
| 5) | Elevator or service centre manager |
| 5) | Radio and TV |
| 5) | Saskatchewan Soil Conservation Association |
| 5) | Local conservation group |
| 6) | University |
| 7) | Machine and chemical companies |

* 1 is best source of information

The survey respondents evaluated a list of ten methods which could be used to encourage soil conservation (Table 12). The responses indicated that farmers would employ more conservation practices if costs were lower, or if government incentives were offered. Actual demonstration projects and equipment trials were preferred over media information. Attempts to support conservation by changing marketing policies was indicated to be the least desirable option listed.

Table 12. Methods through which soil conservation can be encouraged, in rank order

| RANK* | |
|-------|--|
| 1) | Lower cost of agricultural chemicals |
| 2) | Cash per acre incentives to use conservation practices |
| 2) | Conservation equipment available for on-farm trials |
| 3) | Reduced Crop Insurance premiums |
| 3) | More demonstration projects |
| 4) | Local conservation short courses |
| 4) | Locally available soil conservation specialist |
| 5) | Assistance in setting up soil conservation groups |
| 6) | Increased awareness of practices through the media |
| 7) | CWB marketing based on production instead of acreage |

* 1 is best method

CONCLUSIONS

A number of conclusions have been drawn from this survey.

1) Respondents with the least formal education showed the greatest uncertainty about the profitability of conservation practices

2) Present government programs are stated to be relatively unimportant in decisions regarding conservation and cropping

3) Conservation practices are usually found to be useful once tried

4) Education level has a big impact on many attitudes

5) Newspapers, government extension people, friends and neighbours are most frequent sources of soil conservation information; the private sector is not regarded highly.

6) Members of the Saskatchewan Soil Conservation Association are more aware of soil degradation problems and latest technologies in soil conservation

7) Farmers with more education, and those with big farms are less likely to be concerned about cost of equipment but cash incentives are relatively more interest

8) Improved straw and chaff spreading is seen as a necessity by most farmers

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