Agricultural Extension Service ● University of Minnesota

FACT SHEET



AGRONOMY NO. 26

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# Seeding dates for small grains and flax

Wheat, oats, barley, and flax do best where the growing season is relatively cool and moist. Small grain yields often are lower in years when temperatures of 90° F. or above are common during the grain filling period.

Seedlings of spring wheat, oats, and barley are resistant to low temperatures, especially if they are gradually hardened before very cold temperatures. Spring wheat is more resistant to freezing than barley, which is more resistant than oats. Small grains injured by low temperatures often recover and produce a good crop. Seeds of wheat, barley, and oats will germinate at temperatures as low as 35-40° F.

Flax also prefers cool weather during the growing season. Short exposure to freezing temperatures at the seedling stage seldom injures flax, except when it is emerging from the soil. After the plants are 2 to 3 inches tall and hardened, they can withstand temperatures below 25° F. for short periods. Moisture conditions, duration of the low temperature, and weather conditions preceding or following exposure to freezing temperatures will influence the damage or recovery of crops.

It has long been recommended to seed small grains as early as possible in the northern states. Flax also should be seeded early except when weeds, especially wild oats, must be controlled before seeding. Numerous experiments have shown a considerable yield advantage in seeding early.

**Table 1. Effect of date of seeding on barley yields***

| Year | Seeding dates: Early | Seeding dates: Late | Yield (bu./A): Early | Yield (bu./A): Late | Decrease in yield (bu/day) |
|---|---|---|---|---|---|
| | | Crookston | | | |
| 1967 | May 11 | May 31 | 70 | 61 | 0.4 |
| 1968 | April 15 | May 20 | 80 | 50 | 0.9 |
| 1969 | May 11 | May 31 | 81 | 66 | 0.8 |
| | | Average | 77 | 59 | 0.7 |
| | | Morris | | | |
| 1966 | May 7 | May 27 | 28 | 23 | 0.2 |
| 1967 | April 21 | May 9 | 66 | 64 | 0.1 |
| 1968 | April 9 | April 29 | 66 | 58 | 0.4 |
| 1969 | April 23 | May 14 | 76 | 67 | 0.4 |
| | | Average | 59 | 53 | 0.3 |

*Data from D. C. Rasmusson, R. E. Heiner, and S. D. Evans.

### Barley

Table 1 shows the yield results from a recent study at the Crookston and Morris Experiment Stations. The yields are averages for the varieties Dickson, Larker, and Conquest, which were seeded at 90 pounds per acre. Barley seeded early, as soon as the land was suitable for tilling, gave higher yields than barley seeded 3 weeks later. At Crookston each day's delay in seeding resulted in a loss of 0.7 bushels while at Morris the loss amounted to 0.3 bushels per day. Kernel weights were lower when barley was seeded late. The yields of the varieties Dickson, Larker, and Conquest were reduced about the same by delayed seeding.

**Table 2. Effect of nitrogen on yield percent plump kernels, and protein at two seeding dates in North Dakota (1964-67)**

| Fertilizer and soil N, lb./A | Yield (bu./A): Early | Yield (bu./A): Late | Plump, %: Early | Plump, %: Late | Protein, %: Early | Protein, %: Late |
|---|---|---|---|---|---|---|
| 60 | 49 | 44 | 76 | 66 | 12.8 | 13.4 |
| 80 | 53 | 49 | 76 | 67 | 13.1 | 13.6 |
| 100 | 56 | 50 | 76 | 66 | 13.2 | 13.9 |
| 120 | 58 | 52 | 76 | 65 | 13.5 | 14.2 |
| Average | 54 | 49 | 76 | 66 | 13.2 | 13.8 |

In a North Dakota study which supports the Minnesota yield data, a 2-week delay in seeding resulted in lower yields, lower percent plump kernels, and a higher protein percent when compared with the early seeding (table 2). Less nitrogen should be applied to late seeded barley because late seeding increases protein percentage. Protein percentage above 13.5 is not acceptable for malting.

### Wheat

Wheat yields also were reduced by delayed seeding at Crookston and Morris but not as severely as for barley. Table 3 shows wheat yields for two dates of seeding of three varieties at Morris and Crookston. In 1967 the delayed planting gave equal yields at Morris and higher yields at Crookston. However, the 3- or 4-year averages at both locations show a considerable advantage for early planting. A loss of 0.2 bu./ day at Crookston and Morris was observed for each day delay in seeding date. Wheat kernel weight also was lower for the planting date.

Three varieties, Chris, Manitou, and the semidwarf selection, responded similarly to delayed seeding. When seeding must be done considerably later than normal, use early maturing varieties.

**Table 3. Effect of seeding date on wheat yield, Crookston and Morris***

| Year | Seeding dates: Early | Seeding dates: Late | Yield (bu./A): Early | Yield (bu./A): Late | Decrease in yield (bu./day) |
|---|---|---|---|---|---|
| | | Crookston | | | |
| 1967 | May 11 | May 31 | 44 | 46 | +0.1 |
| 1968 | April 15 | May 20 | 52 | 46 | 0.2 |
| 1969 | May 11 | May 31 | 50 | 38 | 0.6 |
| | | Average | 49 | 43 | 0.2 |
| | | Morris | | | |
| 1966 | May 7 | May 27 | 20 | 16 | 0.2 |
| 1967 | April 21 | May 9 | 41 | 41 | 0.0 |
| 1968 | April 9 | May 29 | 47 | 40 | 0.4 |
| 1969 | April 23 | May 14 | 42 | 38 | 0.2 |
| | | Average | 38 | 34 | 0.2 |

* Data from R. E. Heiner, D. C. Rasmusson, and S. D. Evans.

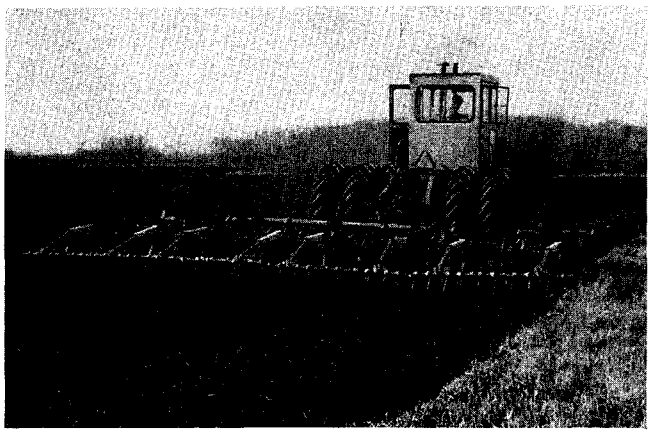

**Figure 1. Preparing a seedbed with a combination field cultivator and harrow.**

### Oats

Table 4 shows the yields from delayed oat planting at Ames, Iowa. Yields decrease 1 bushel per acre for each day's delay after April 16. Similar results could be expected in southern Minnesota, while in northern Minnesota the optimum seeding dates might extend into late April or early May.

**Table 4. Yield of oats seeded on different dates, Ames, Iowa 1954-56**

| | April | | | | | May | | |
|---|---|---|---|---|---|---|---|---|
| | 2 | 9 | 16 | 23 | 30 | 7 | 14 | 21 |
| Bu./A | 71 | 70 | 70 | 63 | 57 | 51 | 35 | 23 |

Oat test weight decreases considerably if seeding is delayed after the optimum dates.

A wide range in maturity exists among oat varieties, thus early varieties should be planted when seeding is delayed. Early varieties have a better chance to fill before hot weather when seeded late than do the late varieties. Also, early varieties will mature more rapidly than late varieties, and therefore be in a less disease-susceptible stage of growth late in the growing season when diseases are often most prevalent. Diseases can cause serious yield losses in late planted oats. The most disease-resistant varieties should be selected whether seeding early or late.

### Flax

Flax should be seeded as early as small grains. Yields were reduced about 25 percent by a 3-week delay in seeding for the north-central region during a 10-year period (1961-1970). Table 5 shows results from seeding date trials in the northern and southern regions of the north-central flax growing area.

**Table 5. Effect of seeding date on flax yield in north-central region, 1961-1970***

| Region | Seeding date | | Yield (bu./A) | | Decrease in |
|---|---|---|---|---|---|
| | Early | Late | Early | Late | yield (bu./day) |
| Northern** | May 13 | June 5 | 20.3 | 16.2 | 0.2 |
| Southern† | April 29 | May 20 | 20.8 | 14.8 | 0.3 |

*Data from V. E. Comstock and J. H. Ford.
**Fargo, N.D., Crookston, Minnesota, Winnipeg and Morden, Canada.
†Brookings and Watertown, S.D., Morris, St. Paul, and Lamberton, Minnesota.

A seeding delay of 3 weeks in the northern region decreased yields less than in the southern region. Perhaps the warmer temperatures during the flowering period in the southern regions resulted in lower yields at the late date.

Seeding flax late also results in lower seed oil percentage. A 3-week delay in planting resulted in a drop of 0.4 percent oil in the seed.

Sometimes, because of excessive moisture or a wild oat problem, it becomes necessary to delay planting. Early to medium-early maturing varieties should be selected for late plantings.

### Summary

Early seeding of small grains and flax allows these crops to complete most of their development before mid-July. Yields usually are higher with early seeding which results in completion of heading and flowering before the hot weather of late July and August. However, small grains and flax should not be "mudded in" just to get these crops planted early. The soil must be dry enough in the spring to prepare a proper seedbed. Seeding dates will vary depending upon soil conditions. In southern Minnesota small grains and flax generally can be seeded in early to mid-April while in northern Minnesota they can be seeded in mid-April to early May.

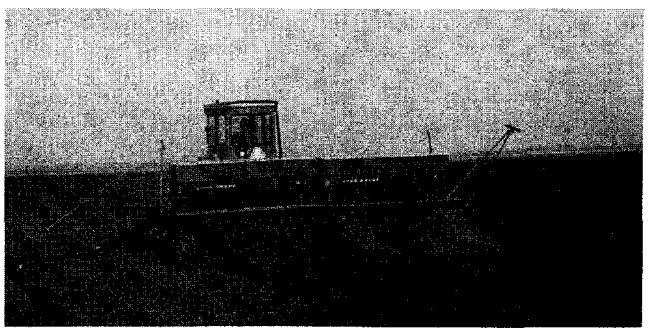

**Figure 2. Seeding wheat in the Red River Valley with a press grain drill.**

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