

# Fall Seeding Versus Spring Seeding in The Establishment of Five Grasses and One Alfalfa in Southern Saskatchewan

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The problems in successful establishment of hay and pasture seedings in southern Saskatchewan are major deterrents to increased acreage of perennial forage crops. The ravages of hot dry summers and long cold winters on forage stands are enough to contend with, without adding an establishment problem which might otherwise be avoided or at least controlled as far as possible. For most of the Northern Great Plains area the annual precipitation is 15 inches or less. Throughout the northern half of this area the winter mean temperatures are below 32°F. from November through March, while the summer months of July, August and September are hot and dry. The five months of frozen soil and the three months of dry summer limits the seeding of forage crops to the remaining 4 months of the year. There is general agreement among workers that forage seedings in the plains area must be confined to fall or spring, but the recommendations differ as to the most suitable time to seed within these periods. Kirk (1937), Heinrichs (1941), White and Horner (1942), and others have con-

cluded that fall seeding is generally an acceptable time to seed forage crops. In most instances these workers used only one or two species, crested wheatgrass usually being one. Those who did include more species conducted experiments which were often confined to fall seeding dates so that within test comparison of fall and spring seedings were not made. Since that time others have conducted dates of seeding trials with recent reports by Douglas *et al.* (1960) who favors fall seeding over spring although the type of seed bed influenced establishment more than seeding dates. Frischknecht (1959) discussed the possible advantages from fall seeded grasses in obtaining better stands because of seed vernalization. McGinnies (1960) has shown best establishments from spring seeding, although the 7500-foot elevation where his trials were conducted was considerably higher than that which occurs in plains area.

The dates of seeding trials discussed in this paper were conducted on cultivated land during the five successive years from 1947-48 to 1951-52.

The tests were conducted at Swift Current, Saskatchewan, on prepared seed beds of Haverhill loam of the Brown (Chestnut) soil zone. The climate at Swift Current is fairly typical of that through southern Saskatchewan, south-eastern Alberta, the eastern half of Montana and western parts of North Dakota. Annual precipitation at Swift Current is about 14½ inches.

Crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*intermedium*), streambank wheatgrass (*riparium*), Russian wild ryegrass (*Elymus junceus*), green stipa grass (*Stipa viridula*) and Ladak alfalfa (*Medicago media*) were the species used throughout the five year seeding trials. Each was seeded by itself in plots 8 feet wide and 40 feet long through a double disc drill equipped with depth control plates which provided for a ¾-inch uniform seeding depth. A uniform rate of seeding was maintained for each date and from year to year by seeding 30 viable seeds per lineal foot of row. Spacing between rows was 12 inches. Four replications in a random block arrangement were used for each seeding date. The seeding date blocks were also randomized as to location.

The trials consisted of 10 seeding dates, 5 during the fall period and 5 commencing in the spring. The fall seedings were

done at two-week intervals from September 1 to November 1, and the spring seedings, also at two-week intervals, were done from May 1 to July 1.

Final seedling stands were determined on all plots by visual ratings. These determinations were not done at specific times since many of the fall sown plots did not show emergence and/or final stand until the subsequent spring.

There seems to be lack of a standard measure or standard criteria for determining the point at which an initial stand can no longer be regarded as successful. Visual estimates of seedling stands are at best arbitrary in nature and may differ between estimators. For the purpose of this study a final seedling stand of 50 percent by visual estimate or greater was considered to provide an acceptable level for good use.

**Results and Discussion**

The five-year mean final seedling stands for each seeding date are shown in Figure 1. Individual yearly results showed some variation that is not indicated in these graphs, but essentially the results were similar between years. Because of these similarities and because analyses of variance showed an acceptable level of variability within years it was considered desirable to present the results as mean values in a simple graphic form.

It was evident that good emergence and seedling stands were not obtained during the late spring and early summer periods for all the crops although some, such as the large seeded intermediate wheatgrass and the native streambank wheatgrass, performed better than others.

Establishment was generally lower with seedings made in early fall compared with those made in the late fall or early spring. However, species by dates interaction showed such distinct differences that generalizations about seeding dates

were not always valid. The results of the individual crops must be studied in the light of their own particular behavior before any valid interpretations can be made.

Russian wild ryegrass showed the narrowest range of acceptable seeding dates since only in the last fall seeding and in the first spring seeding were the resulting seedling stands better than 50 percent. This behavior has been observed in numerous

field seedings also, and is probably the main cause of so many establishment failures. Russian wild ryegrass characteristically shows a slow seedling growth and is particularly sensitive to poor cultural practices, especially depth of seeding and adverse weed competition.

Alfalfa displayed a rather distinct, but fairly wide range of preferred seeding rates. The successful fall seeding dates were limited to late fall, but the

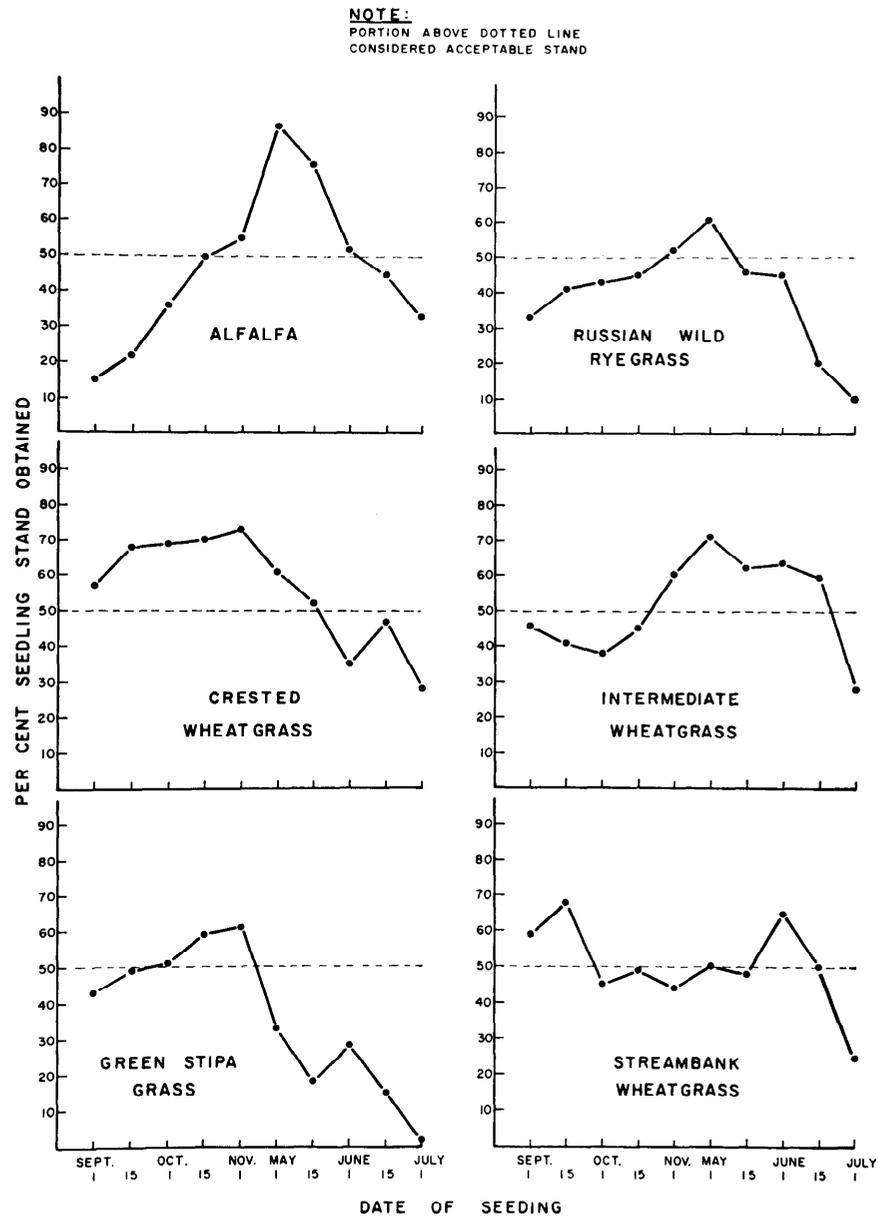


FIGURE 1. Final stands obtained at different dates of seeding during the fall and spring at Swift Current, Saskatchewan. These are average values from 5 years of trials from 1947-48 through to 1951-52.

spring seeding range for good establishment extended all through the month of May. Since alfalfa is the legume most commonly used in grass-legume mixture plantings the seeding dates favoring the alfalfa component becomes a very important consideration. It will be seen that if the alfalfa graph were superimposed on each of the grass graphs at least some portions of the two would occur simultaneously at or above the line of acceptability.

It will not surprise anyone that crested wheatgrass showed good establishment over a wide range of seeding dates. This grass has an enviable area of adaptability throughout all of the Northern Great Plains area because of its sheer ability to establish and persist. Only during the late spring and early summer period of the seeding trials did seedling stands drop below 50 percent. The performance of crested wheatgrass has long been known and it was included in these trials as the check.

Intermediate wheatgrass had an extended seeding date range although this period was, with the exception of the Nov. 1 date, limited to spring seeding. Being a large seed with a relatively plump caryopsis this species showed good springtime survival even in drying soil. It has often been considered as not excessively winter hardy, and fall germinated seeds and seedlings have not shown good survival at Swift Current. On the other hand, its excellent establishment from spring seedings has contributed to the good stands obtained from a mixture of intermediate wheatgrass and alfalfa

for hay fields.

Green stipa grass (green needle grass) showed the customary fall-preferred seeding dates which have been recognized previously by a number of workers and reviewed by Rogler (1960). Seeding from mid-September to late fall resulted in 50 percent stands or better. By contrast, all stands from late spring and early summer seedings were very poor or complete failures. Of the 6 species reported in this study, green stipa grass was the only one which did not show some success from early spring seeding.

Streambank wheatgrass did not show a consistent preferred seeding date within the seeding date schedule. Although early fall and one late spring seeding did result in better than average stands, they were not consistently better and since most dates gave stands near the 50 percent acceptability level the results could not be interpreted to favor a particular seeding time. This strongly growing, well adapted, drought tolerant grass displayed the wide range of general conditions under which it would establish.

#### Summary

Crested wheatgrass, intermediate wheatgrass, streambank wheatgrass, Russian wild ryegrass, green stipa grass, and alfalfa were seeded on prepared land at Swift Current, Saskatchewan on 10 seeding dates for 5 successive years. Five of the dates were during the fall while five were in the spring and early summer.

The percent of seedling stand obtained was determined for each at each seeding date. Most

of them showed some preference within the fall and spring interval seeding period. Alfalfa, intermediate wheatgrass, and Russian wild ryegrass showed better results from spring seeding with some success from late fall seeding, while crested wheatgrass and green stipa grass displayed better seedling stands from fall plantings. Streambank wheatgrass showed the widest range of seeding date success.

The importance of selecting seeding dates when using alfalfa and grass in mixture is indicated.

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