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Berseem Clover Planting Date

Under the conditions of this study, early planting resulted in higher yields. These annual legumes withstood low temperatures during germination and emergence and in the seedling stage.

By Raymond L. Ditterline¹, James R. Sims¹, Leon E. Welty², Malvern P. Westcott³, David M. Wichman⁴, Robert L. Dunn¹ and Gil Stallknecht⁵

Berseem clover traditionally has been grown as a winter annual forage crop in areas with a Mediterranean climate (Egypt, India, southern United States) where the highest temperatures occur during planting and harvest and the lowest temperatures occur in mid-season. We were concerned that under Montana conditions, emergence of early spring planted berseem clover might be inhibited by low temperatures or that a hard frost might kill emerged seedlings. The purpose of these studies was to determine the best time to plant berseem clover in Montana.

Materials and Methods

Experiment 1: 1987

In 1987, 'Bigbee' berseem clover was planted under irrigated and dryland conditions on five

¹Plant and Soil Science Department, Montana State University, Bozeman, MT 59717; ²MSU Agricultural Experiment Station, Northwestern Agricultural Research Center, Kalispell, MT 59901; ³MSU Agricultural Experiment Station Western Agricultural Research Center, Corvallis, MT, 59828; ⁴MSU Agricultural Experiment Station Central Agricultural Research Center, Moccasin, MT 59462; ⁵ MSU Agricultural Experiment Station Southern Agricultural Research Center, Huntley, MT 59037.

different dates at the Arthur H. Post Field Research Laboratory west of Bozeman. A randomized complete block design with four replications was used. Planting dates were May 9, May 15, June 3, June 9 and June 16.

Prior to planting, each field was fertilized according to fertility requirements for alfalfa. The seed was inoculated with the *Rhizobium leguminosarum*-biovar-*trifolii* that is specific for berseem clover, and planted one-half inch deep into a very firm seedbed at the rate of 10 pounds Pure Live Seed (PLS)/acre. Plots were six feet wide, 10 feet long with rows six inches apart. Plots were hand weeded and water was applied to the irrigated experiment as needed.

The plots were harvested on August 15, 1987. A harvest sample (2 X 10 feet) was taken from the middle of each plot with a Rem flail-type harvester and was weighed immediately. A random shrink sample from each plot was used to determine moisture.

Data were analyzed by analyses of variance using MSUSTAT, Version 4.12, developed by Richard E. Lund, copyright 1988, Montana State University. Least significant differences were used to separate treatment means.

Experiment 2: 1989

In 1989, a similar experiment was planted at five Montana Agricultural Research Centers (Bozeman, Corvallis, Huntley, Kalispell, and Moccasin) to determine how well berseem clover would establish and perform over a wide range of Montana conditions. A split-plot, randomized complete block design with four replications was used. Main

plots were five planting dates and subplots were three varieties (Bigbee and 'Multicut' berseem clover and 'Nitro' alfalfa - a non-dormant alfalfa variety that was used as the control). The first planting date was as soon after April 1 as weather permitted at each location (Table 1). Subsequent plantings were about two weeks apart.

Plot size varied slightly with locations. They were 20 feet long, four or six feet wide, with rows 12 inches apart. Planting rate was 30 PLS/square foot (about six and seven pounds PLS/a for alfalfa and berseem clover, respectively). Except for the dryland site at Moccasin, each location was irrigated as needed. The experiments were hand weeded, except for Huntley where 2,4-DB was used to control broad-leaved weeds. The 2,4-DB greatly reduced the berseem clover stands and the Huntley data are not shown.

The first forage harvest for each planting date was made when new growth appeared from the berseem clover crowns. The plants were 12-15 inches tall at this time.

Table 1.
Berseem clover-annual alfalfa planting and harvesting dates — 1989

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	Planting	9			
Location	Date	1	2	3	
Bozeman	Apr 21	Jul 6	Aug 7	Sep 12	
Irrigated	May 1	Jul 6	Aug 7	Sep 12	
	May 10	Jul 14	Aug 14	Sep 20	
	May 22	Jul 22	Aug 29	Oct 12	
	Jun 1	Aug 7	Aug 12		
Corvallis	Apr 13	Jul 19	Aug 21	Sep 29	
Irrigated	May 2	Jul 19	Aug 21	Sep 29	
	May 15	Aug 1	Aug 8		
	Jun 2	Aug 21	Sep 29		
	Jun 27	Sep 29			
Kalispell	Apr 11	Jul 7	Aug 7	Sep 6*	
Irrigated	Apr 20	Jul 10	Aug 7	Sep 6*	
	May 1	Jul 19	Aug 18	Sep 27	
	May 11	Jul 21	Aug 18	Sep 27	
	May 22	Jul 24	Aug 22	Sep 27	
Moccasin	Apr 14	Jul 19	Sep 12		
Dryland	Apr 20	Jul 19	Sep 12		
	May 5	Jul 24	Sep 12		
	May 17	Aug 1	Sep 12		
	May 26	Aug 1	Sep 12		

*For these two plantings, Kalispell conducted a fourth harvesting on Sep. 27 of only Nitro alfalfa Data were analyzed using MSUSTAT-AVMF program to determine if treatments (planting date, varieties, and planting date x varieties interaction) were significant. All other procedures were the same as for the 1987 study.

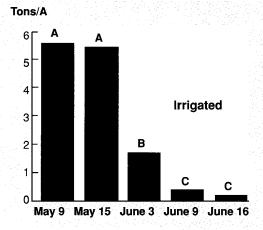
Results and Discussion

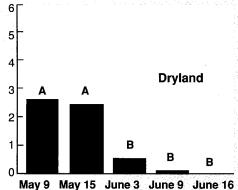
Experiment 1

We think this was the first time berseem clover had ever been planted in Montana. We had planned to plant at weekly intervals, however rain prevented us from seeding for 17 days after the second planting, at which time the planting schedule was resumed.

Forage yield for the irrigated study was about twice as high as for the dryland study (Figure 1). Berseem clover planted at the early dates (May 9 and May 15) had the highest forage yields under both irrigated and dryland conditions. Yield decreased substantially for the June planting dates due to delayed planting and a severe round leaf mallow infestation that emerged after the rains.

Figure 1:
Planting Date Effect on Forage Yield of Bigbee
Berseem Clover - Bozeman 1987





The first planting date ranged from April 11 at Kalispell to April 21 at Bozeman (Table 1). Low soil and air temperatures delayed seedling emergence. Seedlings from the first planting emerged at about the same time as those from the second planting at each location. This resulted in similar harvest dates for the first two planting dates at each location. Plots seeded in April or May were usually ready to be harvested in July. As a general rule, the legumes were ready to be harvested 60 to 70 days after planting.

At the Bozeman, Corvallis and Kalispell irrigated sites, harvests were about 30 days apart (Table 1). The berseem clover was still vegetative (no flowers) but had initiated new growth from the crown and the alfalfa was in the early bloom stage. Three forage harvests were obtained from plots

planted in April and May, except at Kalispell where April-planted Nitro alfalfa was harvested four times. Only two harvests were obtained for June plantings. Very little regrowth occurred after the last harvest in September, although the plants remained green until covered by snow.

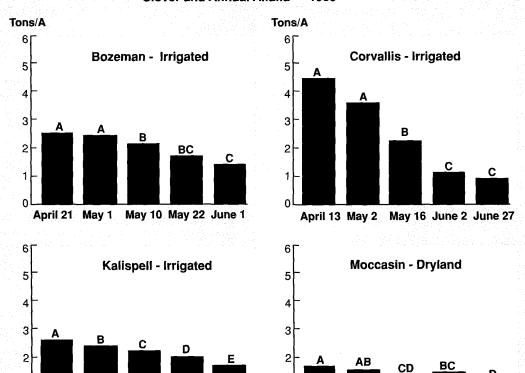
At Moccasin, the dryland sites produced only two harvests (Table 1). Following the first harvest, the legumes grew very slowly and were not ready to be harvested again until a hard frost stopped growth.

The planting date interaction with varieties at each location was not significant, indicating that varieties performed similarly at each planting date. Planting date data are averaged over varieties, and variety data are averaged over planting dates.

There was a definite trend for higher yields with earlier plantings (Figure 2). With the exception of

April 14 April 20 May 6 May 17 May 26

Figure 2:
Planting Date's Effect, Averaged Across Legumes, on Forage Yield of Berseem
Clover and Annual Alfalfa — 1989



April 11 April 20 May 1 May 11 May 22

Kalispell, the first two planting dates had similar yields and were significantly higher than the last three planting dates. These data are similar to those for annual cereal crops such as barley, oats, and spring wheat commonly grown in Montana and suggest that yield can be maximized by early planting.

No variety consistently had the highest forage production across all locations (Figure 3). At Bozeman, all varieties yielded similarly. Nitro alfalfa had much higher yields than either berseem clover variety at Corvallis. At Kalispell, Nitro alfalfa and Multicut berseem clover yielded similarly and more than Bigbee, and at Moccasin, Multicut and Bigbee berseem clover had higher yields than Nitro alfalfa.

Periodic, short duration, low night temperatures did not hurt stand establishment. At Bozeman, temperatures dropped to 22°F on April 29. The

legumes had not emerged yet and were probably protected by the soil. After emergence, the lowest temperatures were experienced on May 19, 20 and 21 when the lowest night time temperature dropped to 25°F. The other three locations experienced similar weather patterns with Corvallis having the lowest temperature of 21° F on April 29 and 30. We do not know how these annual legumes would respond to prolonged sub-freezing weather.

Under the conditions of this study, early planting resulted in higher forage yields. We were pleased to learn that these annual legumes could withstand low temperatures during germination and emergence (21°F) and in the seedling stage (25°F). Early seeding seems desirable; however, we are reluctant to unconditionally recommend early seeding because we do not know how well they would withstand prolonged sub-freezing temperatures.

Figure 3:
Forage Yield, Averaged Across Planting Dates, of Bigbee and Multicut
Clover and Nitro Alfalfa – 1989

