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FORAGE PRODUCTION IN A DOUBLE-CROP SYSTEM

Glenn E. Shewmaker, Research Technician
Hank F. Mayland, Research Soil Scientist
USDA-ARS in Cooperation with University of Idaho

The basic objective in our double-cropping research is to determine the optimum management practices for the winter crop and summer crop phases. The major emphasis of the research through the summer of 1985 has been to determine the best combinations of these management practices and their effect on the quantity and quality of green-chop forage produced by winter cereals, legumes, and combinations of winter cereals and winter field peas.

FACTORS AFFECTING WINTER CEREAL FORAGE YIELD AND QUALITY

In general increasing the seeding rate from 60 pounds per acre to 180 pounds per acre will increase forage yields. This effect is shown in Figure 1. Note that the yields are shown as tons of dry matter per acre. This is done to eliminate the effect of highly variable percent moisture. Green-chop or silage yields at 65 percent moisture can be estimated by multiplying the dry matter yields by three.

Figure 2 shows that early planting dates (September 15-30) as opposed to late (October 1-20) produce greater forage or grain yields. However, planting too early might result in the introduction of barley yellow dwarf virus by aphids.

Increasing nitrogen fertilizer rates from 150 to 200 pounds per acre will increase forage and grain yields (Figure 3). These variables, in addition to the weather, determine the amount of tillering. Increased tillering will increase forage yields. The high seeding rate and nitrogen rate will produce the best yields, however not necessarily a profit!

Forage yields are usually the highest in the order: triticale, rye, wheat, barley (see Figure 4). There is much variation within and between varieties of each cereal type. Cereal forages generally yield better than field pea forage, but mixtures of cereals and peas still show promise.

There are two rules of thumb concerning cereal forage and double-cropping. Forage harvest should be targeted for June 10-17, in the Twin Falls area if you plan to double crop. In longer growing season areas you might be able to postpone harvest to June 20. The break-even point for harvesting cereal forage in a double-crop system is in the range of 3.5 to 4 tons of forage dry matter per acre or approximately 10-12 tons of silage per acre (70% moisture basis). Yields reach this break-even point in the Parma area on about June 1. In most years not even barley will reach the soft dough stage at Kimberly by June 15.

As the cereal forage matures from the pre-boot stage to the soft dough stage, the concentration of dry matter increases and crude protein decreases (see Figure 5). The University of Idaho is conducting a feeding study to determine the quality factors of the various cereal forages, but results are not yet available.

SUMMER FORAGE CROPS

Comparison of Conventional, Late-Planted, and Double Crops

In the summer of 1985 an experiment was conducted to compare conventional, late-planted, and double-crop yields. Four crops were seeded at the normal time, or on the 14th of June (late-planted system), or on the 14th of June following removal of 2.3 tons dry matter per acre of winter wheat forage (double-crop system). The conventional crop was treated as a standard procedure for the area. The exception being that all three systems were planted on 30 inch row centers. The conventional corn silage, sweet corn, and forage sorghum crops were planted on the 14th of May. The conventional Viva pink beans were planted on the 24th of May. The late-planted system was treated the same as the conventional except the ground was left fallow until planted on June 14. The wheat stubble was sprayed with Roundup herbicide prior to seedling emergence. A bull tongue was used in front of the planter unit in the center of the hill for a minimum tillage planting.

The crops grown and their yields are shown in Table 1. Yields of late-planted Viva pink beans and sweet corn (as silage) were equivalent to the conventional crop yields. The lower yields from the double-cropped versus late-cropped system may be caused by allelopathy (the effect of substances in the soil which resist the germination of other species) by the wheat stubble, to a less desirable seed bed and hence slower emergence of seedlings, or some other unknown factor(s). The wheat forage removed 160 pounds of nitrogen per acre.

Double-Crop Versus Green Manure

comparison of the benefits of green manure and double-crop winter cereal forage was evaluated by orn silage yields in the summer of 1985. The 75-day corn was planted June 15th following: (1)

plow-down of 1.7 tons per acre of winter peas (dry matter basis) containing 150 pounds of nitrogen per acre; or (2) green-chopped winter cereal forage yielding 3.0 tons of dry matter per acre and removing 180 pounds of nitrogen per acre. Nitrogen fertilizer was applied only to the winter wheat strips at 200 pounds per acre rate.

Silage yields following the green manure crop--which had no commercial fertilizer applied--were equivalent to those obtained following the green chop wheat when an additional 150 pounds of nitrogen per acre was applied to the corn. The ear development of the corn was dramatically reduced by nitrogen rates less than 150 pounds per acre in the winter-crop forage strips.

ECONOMICS OF DOUBLE-CROPPING

In cooperation with the University of Idaho, we are presently evaluating the potential for profit in enterprise budgets for the various systems of double cropping. However, depending on the variable costs of a grower, the break-even point appears to be 3.5 to 4 tons per acre of forage dry matter. With further study we might recommend plowing down green manure as an equally profitable cropping system.

CONCLUSIONS

1. Double-cropping is feasible in the area down the Snake River Plain from Twin Falls to the Treasure Valley area.
2. There is a risk of crop failure if a crop such as beans is planted following the winter forage crop. However, a forage crop even if frozen will have salvage value.
3. A winter cereal forage crop, if planted early enough, will often protect the soil from wind and water erosion.
4. Winter cereal crops will scavenge more of the soil nitrogen and preclude its leaching beyond the root zone of spring crops.
5. Early planting date is important for forage yields, except for increased risks of barley yellow dwarf virus.
6. High seeding rate is important for forage yields.
7. Peas in the forage mixture have benefits. Peas bind the cereal stems which reduces lodging and allows for better pickup from the windrow. The inclusion of peas should also reduce slightly the nitrogen fertilizer required and improve the quality of the forage; however these have been difficult to measure.
8. The selection of cereal type is important for forage yields. The higher yielding cereals may sacrifice some forage quality, however.
9. There is much variation between years and within the same varieties. For example, forage dry matter yields varied from 1 to 4.2 tons per acre for Stephens wheat on 10 different grower fields in the Magic Valley on June 15, 1984.
10. A grower must be well organized to double-crop successfully. Weather conditions must also be cooperative for the narrow window of time you have to harvest the winter crop and plant the summer crop.

Table 1. RELATIVE YIELDS FOR THREE CROPPING SYSTEMS

CROP	CONVENTIONAL	RELATIVE TO CONVENTIONAL	
		DOUBLE CROP#	LATE
BEANS	28 CWT./A	83%	100%
+FIELD CORN	33 T/A	45% (25)	63% (30)
+SWEET CORN	16 T/A	75% (22)	99% (26)
+FOR. SORGHUM	30 T/A	56% (27)	76% (33)

#YIELDS IN ( ) INCLUDE 10 T/A WINTER CEREAL FORAGE.
+70% MOISTURE BASIS.
KIMBERLY, IDAHO 84-85.

TABLE 2. Variety yields (tons of dry matter/acre) 6-15-84. Means followed by common line are not sig. dif. (P>.05).

VARIETY	YIELD (T/A)
Triticale 313-15	3.4
876-10	3.1
Wheat -NK817	2.7
Rye	2.6
Triticale 313-737	2.6
Wheat -Lewjain	2.5
-Daws	2.4
-Hyslop	2.4
-Stephens	2.4
-Neely	2.4
Barley -Schuyler	2.3
Wheat -Hill 81	2.2
Barley -Kamiak	2.2
Triticale A 476	2.1
Barley -Boyer	1.8

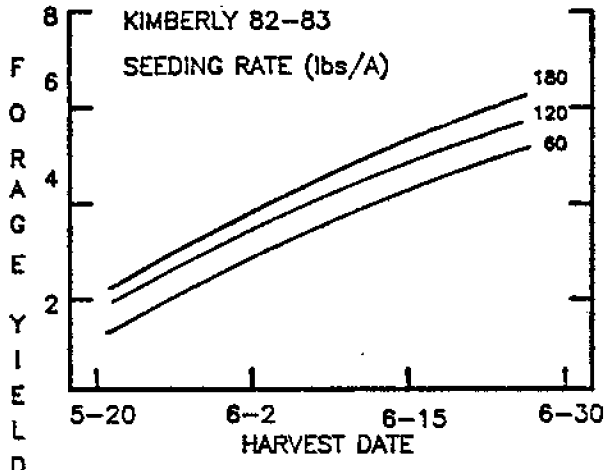

FIGURE 1. Effect of seeding rate on cereal forage yield.

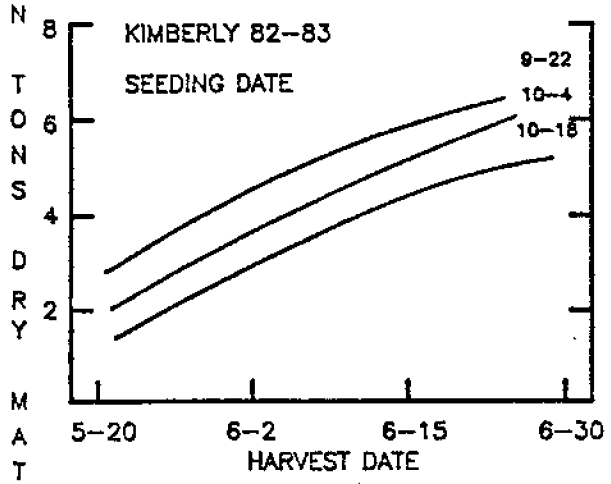

FIGURE 2. Effect of seeding date on cereal forage yield.

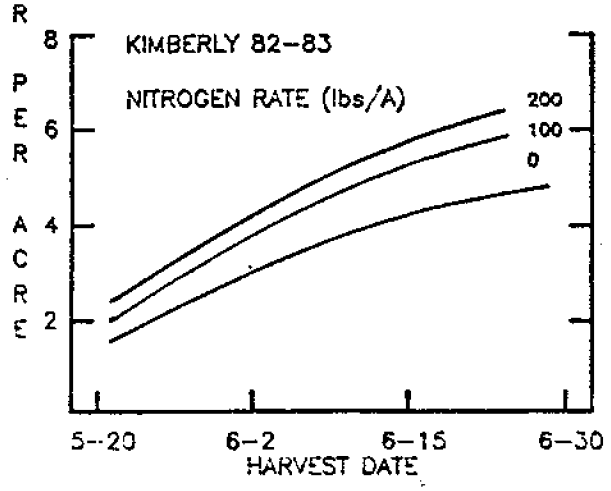

FIGURE 3. Effect of nitrogen rate on cereal forage yield.

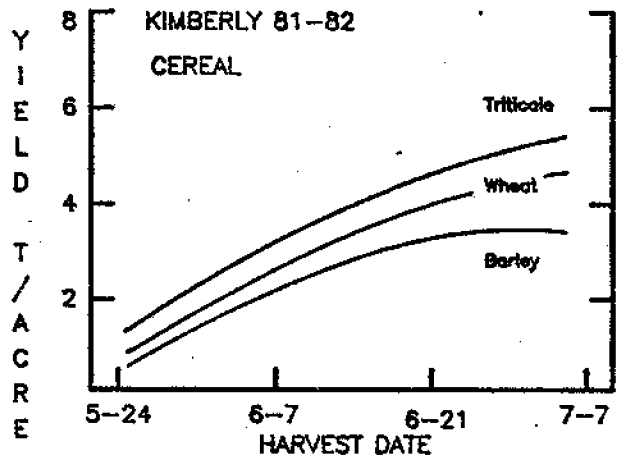

FIGURE 4. Average forage yields of 3 forages at 4 dates.

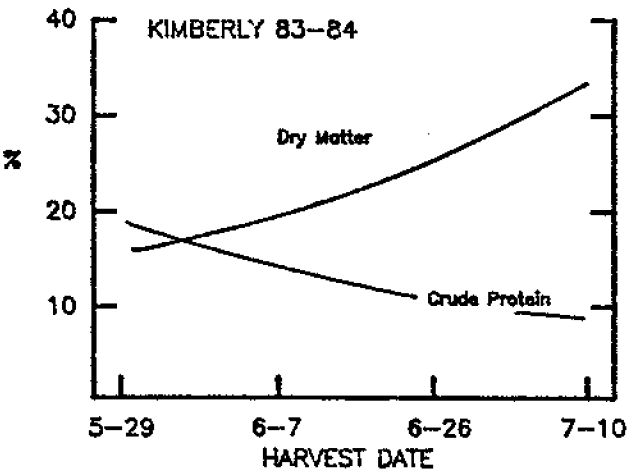

FIGURE 5. Change in dry matter and crude protein conc. (means of 10 Stephens wheat fields in Magic Valley)