Crop Management

Corn Silage Hybrids and Plant Populations

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We evaluated the grain and silage yield response of nine hybrids from 1991 to 1993 and reported maximum yields at 36,000 kernels/acre for silage and 31,000 kernels/acre for grain (What's Cropping Up, 1993 Vol.3, No.6, p.1-3). Silage quality, especially neutral detergent fiber (NDF), and crude protein (CP), decreases as plant populations increase (What's Cropping Up?, 1997, Vol.7, No.1, p. 2-3), so we currently recommended seeding rates at about 34,000 kernels/acre to offset the silage quality decline as populations increase. We also demonstrated in the late 1990s that leafy and brown midrib hybrids have similar yield and quality responses as other hybrids to plant populations so we also recommend dropping at about 34,000 kernels/acre for leafy and brown midrib hybrids (What's Cropping Up, 2000,Vol.10, No.1, p.4-6). Nevertheless, some still question whether leafy and brown midrib hybrids should be planted at 34,000 kernels/acre. Consequently, we initiated a 2-year study at the Aurora Research Farm in 2008 and 2009 to evaluate two Pioneer (34T55 and 34A89), two DeKalb (DKC61-69 and DKC63-42), two leafy (TMF2Q716 and 2W587, Mycogen), and two brown midrib (F2F566 and F2F610, Mycogen) hybrids at planting rates of 25,000, 30,000, 35,000, and 40,000 kernels/acre to determine if different corn silage hybrid types have different yield and quality responses to plant populations. We planted the study during the last week of April and harvested during the first week of September in both growing seasons.

Table 2. Planting rate effects on moisture and yield (tons/acre@65% moisture) of two Pioneer, two DeKalb, two leafy, and two brown midrib (BMR) corn silage hybrids, averaged across the 2008 and 2009 growing seasons, at the Aurora Research Farm.

	HYBRIDS							
	Pioneer	DeKalb	Leafy	BMR	Pioneer	DeKalb	Leafy	BMR
PLANTING RATE	MOISTURE				YIELD			
Kernels/acre	----------%----------				----------tons/acre (65% H20)---------			
25,000	67.1	67.9	66.3	69.0	25.3	25.5	23.2	22.2
30,000	66.7	67.9	66.6	68.9	26.0	25.6	24.3	24.0
35,000	66.5	68.1	66.1	68.7	26.6	**26.0**	**25.7**	**24.8**
40,000	67.3	67.9	66.4	69.2	**27.6**	25.8	25.8	24.8
Avg.	66.9	67.9	66.3	69.0	26.4	25.7	24.8	23.9

The 2008 and 2009 growing seasons had close to normal total growing degree days (GDD) from May through August with 10 GDD above normal in 2008 and 55 GDD below normal in 2009 (Table 1). Likewise, total precipitation from May through August averaged close to normal compared with the 30-year average of 14.18 inches. Consequently, growing conditions for corn silage production at the Aurora Research Farm in 2008 and 2009 were probably as close to normal as possible for two consecutive growing seasons.

When averaged across growing seasons, there was indeed a hybrid by planting rate interaction but that was because the Pioneer hybrids yielded best at 40,000 kernels/acre, whereas the DeKalb, leafy, and brown midrib hybrids did best at 35,000 kernels/acre (Table 2). Planting rates did not affect moisture at harvest (Table 2). As expected NDF showed a linear increase and CP showed a linear decrease as planting rates increased (Table 3). The CP decreased presumably because the increased yield at higher plant populations resulted in a dilution effect on the N or CP. The NDF usually increases as plant populations increase because there is less grain in the crop at the higher plant densities but plant populations had

Table 1. Average growing degree days (GDD) and monthly precipitation at the Aurora Research Farm during the 2008 and 2009 corn silage growing seasons.

	GROWING DEGREE DAYS			PRECIPITATION		
Month	2008	2009	30-yr mean	2008	2009	30-yr mean
		°F			in.	
May	236	330	315	1.39	3.77	3.17
June	586	454	498	3.76	4.75	4.09
July	677	555	632	5.44	2.43	3.31
August	547	642	591	3.03	3.64	3.61
Total	2046	1981	2036	13.62	14.59	14.18

no effect on starch concentrations in this study. Consequently, we are not sure why NDF increased as plant populations increased. As shown previously, plant populations did not affect NDFD (What's Cropping Up?,1997 Vol.7, No.1, p.2-3).

Conclusion:

Based on the results of this study, we will continue to recommend planting rates of about 35,000 kernels/acre for all hybrids, regardless of the hybrid type. The DeKalb, leafy, and brown midrib hybrids had their highest yield at 35,000 kernels/acre with no real detrimental effect on NDFD and starch concentrations, the major determinants of silage quality. The Pioneer hybrids however yielded best at 40,000 kernels/acre with just a slight increase in NDF and a decrease in CP in the 2 years of this study when drought stress did not occur. Consequently, corn silage producers may wish to experiment with higher seeding rates for Pioneer hybrids, especially with these two hybrids on soils or in regions where drought does not occur often. The results of this study indicate that leafy and BMR hybrids yield best at 35,000 kernels/acre under NY growing conditions when drought stress does not occur.

Table 3. Planting rate effects on silage quality, including neutral detergent fiber (NDF), 30-hr NDF digestibility (NDFD), crude protein (CP), and starch of two Pioneer, two DeKalb, two leafy, and two brown midrib (BMR) corn silage hybrids, averaged across the 2008 and 2009 growing seasons, at the Aurora Research Farm.

	HYBRIDS							
	Pioneer	DeKalb	Leafy	BMR	Pioneer	DeKalb	Leafy	BMR
PLANTING RATE	NDF				NDFD (30 hr)			
Kernels/acre	----------%----------				----------%----------			
25,000	39.8	39.5	40.1	41.3	58.7	58.3	58.7	71.2
30,000	40.8	39.9	41.4	41.1	59.3	57.7	59.1	72.3
35,000	40.9	39.9	40.4	41.1	57.9	57.2	59.6	72.2
40,000	**41.4**	**40.6**	**42.0**	**42.5**	59.3	57.4	59.5	73.0
Avg.	40.7	39.9	40.9	41.5	58.8	57.6	59.2	72.2
	CP				STARCH			
25,000	**8.9**	**8.6**	**8.8**	**8.8**	33.3	34.6	34.6	33.3
30,000	8.5	8.3	8.6	8.6	34.2	34.6	34.5	32.1
35,000	8.3	8.3	8.4	8.5	33.9	34.9	34.8	32.6
40,000	8.2	8.1	8.2	8.4	33.8	34.7	34.0	31.5
Avg.	8.5	8.3	8.5	8.6	33.8	34.7	34.5