

## ADAPTED CORN HYBRID VARIETIES<sup>1</sup>

By

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The yield and production of corn in North Dakota have been high year after year for several recent years (Table 1). Although the acreage harvested has not increased, yield and production have increased materially. Adequate moisture, favorable temperature, and better, timely cultural practices have all contributed toward the higher yield, however, the use of high yielding and better adapted hybrid varieties has not only contributed towards increased yields but has greatly increased the efficient use of corn harvesting machinery. The potential yield is higher in eastern areas where a 60 bushel per acre or higher yield is not uncommon, while in western areas the yield is lower. The acreage of corn planted with hybrid seed has increased from 0.4 percent in 1938 to about 50 percent in 1948. The extent of hybrid seed planted in 1948 ranged from a low of 17 percent in the southwestern area to a high of 80 percent in the southeastern area. This profitable use of hybrid varieties is attributed to the development and introduction of high yielding adapted varieties that mature in an average growing season in most of the corn-growing zones of the State. However, for extreme northern zones still earlier maturing hybrids are needed with greater tolerance to cool temperature, better lodging resistance and higher ear types than the early maturing flint varieties which are now generally grown.

**Table 1.—Harvested corn acreage, average yield, total production, and percentage of corn acreage planted with hybrid seed in North Dakota. (Data from Bureau of Agr. Econ., U. S. Dept. Agr.)**

Year	Acreage harvested	Acre yield bu.	Total production bu.	Percent of acre planted with hybrid seed
1929-31 av.	1,084,000	15.3	16,587,700	1938=0.4
1932-41 av.	1,171,500	15.7	18,356,400	1941=7.5
1942	1,160,000	25.0	29,000,000	11.8
1943	1,126,000	22.5	25,335,000	16.7
1944	1,250,000	29.0	36,250,000	24.9
1945	1,225,000	21.0	25,725,000	31.5
1946	1,213,000	21.5	26,080,000	47.0
1947	1,189,000	20.5	24,374,000	48.0
1948 prelim.	1,130,000	26.0	29,380,000	49.5
1942-48 av.	1,184,700	23.65+	28,020,600	

### What is a Good Corn Hybrid

Hybrid corn, as it is known today, is produced by the controlled crossing of specially selected and tested pure inbred lines. The inbred lines are developed by inbreeding and selection for a number of years thus eliminating undesirable hereditary characters. The characteristics of hybrids will depend to a large extent upon the

<sup>1</sup>This article deals primarily with corn hybrids. Brief reference is made to open-pollinated varieties such as Dakota white Falconer, N. W. Dent, Minn. 13 (Honey strain) etc.

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nature and heredity of parent inbred lines. The hybrid seed corn must be produced anew every year by crossing proven pure lines or specific single crosses. In the eastern part of the State a good corn hybrid yields from 10 to 28 percent higher and is more resistant to lodging and disease than commonly grown Haney strain of Minnesota 13. When compared with Falconer in the western area a good hybrid has yielded only from 5 to 10 percent higher but the greatest advantage of hybrids in this area are higher ears, greater resistance to lodging, more uniformity in plant and ear type which all contribute towards ease and efficiency of harvesting the crop.

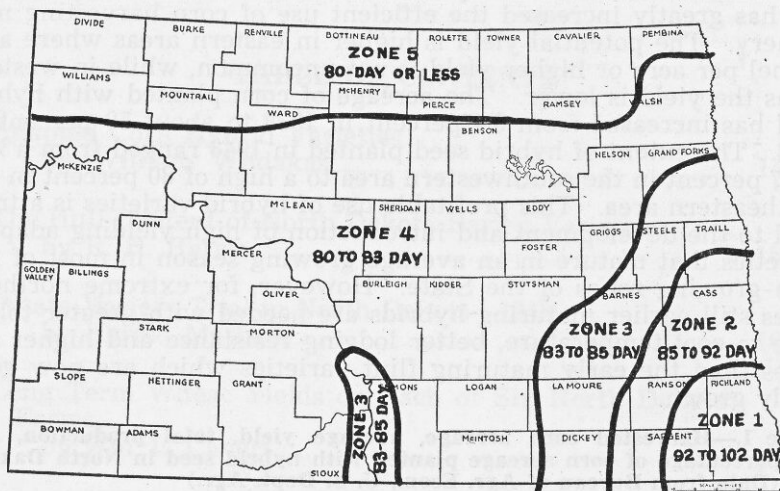


FIG. 1. - CORN MATURITY ZONES OF NORTH DAKOTA

The maturity zones indicate where a corn variety of a given maturity (in days) has matured satisfactorily in the average seasons. Within each zone earlier maturing varieties have superior maturity and yield in the unfavorable seasons.

#### Adaptability of Corn Hybrids

The hybrid varieties similar to the open-pollinated varieties are specific in adaptability. An adapted corn hybrid fits the soil, climate and cultural conditions in which it is grown. Some hybrid varieties have a wider range of adaptability than others. The Corn Maturity Zones of North Dakota, Fig. 1, show where in an average growing season, a corn of given relative maturity is likely to mature. Within each maturity zone the earlier maturing strains are likely to be better adapted in heavy and cold clay soils. However, in light textured fertile soil, well sheltered valley lands, irrigated fields or other conditions which promote rapid growth and maturity later maturing strains are likely to mature satisfactorily and yield high. **While a variety should use all the available growing season it should reach a desired stage of maturity in an average growing season.** In a long and favorable season later maturing strains yield higher, but under unfavorable conditions and in a short growing season

Table 2.—Comparison of Nodakhybrid 301 in yield, lodging, smut and ear height with older varieties or hybrids. Varieties are arranged in order of relative maturity (R.M.).

Variety	N. Dak. R.M. days	Eastern Area						Central and Western Area				Lodg- ing %	Smut %	Ear height inches	
		Barney 1944- 1948	Maple- ton 1944- 1948	Fargo 1944- 1948	Lari- more 1943- 1948	Edge- ley 1943- 1948	Bis- marek 1943- 1948	Minot 1945- 1948	Dick- inson 1944- 1948	Williston D.L. 1945- 1948	Irr. 1944- 1948				
		Bushels per acre													
Dakota White	75	.....	.....	42.9	.....	32.0	37.1	30.7	23.2	28.4	.....	44	3	8	
Falconer	80	.....	.....	42.9	.....	32.0	37.1	34.6	30.8	32.1	68.0	36	4	12	
Nodakhybrid 203	80	.....	49.6	42.3	39.0	31.9	33.3	25.8	21.6	29.0	60.7	11	2	21	
Nodakhybrid 208	81	.....	.....	.....	.....	.....	.....	35.5	32.3	33.9	.....	21	2	19	
Nodakhybrid 201	82	41.6	52.2	46.3	42.2	35.6	37.2	29.4	27.9	28.9	63.8	13	1	25	
Wis. hybrid 240	82	.....	.....	43.4	41.9	36.5	36.5	30.6	27.7	29.0	64.6	16	2	23	
Nodakhybrid 304	83	42.9	53.8	.....	.....	.....	.....	32.7	29.6	31.2	.....	4	2	25	
Nodakhybrid 301	83	45.8	58.4	51.3	44.7	37.8	37.8	33.1	32.4	32.7	68.3	4	1	26	
Wis. hybrid 255	83	.....	.....	46.2	40.4	32.9	35.5	.....	.....	.....	.....	9	3	26	
Minn. 13 (Haney)	85	39.7	49.1	43.9	39.4	29.7	34.7	26.0	23.4	24.3	58.6	21	4	24	
Wis. hybrid 279	85	44.1	55.9	48.1	42.9	34.4	37.0	29.1	26.3	29.8	68.5	5	2	28	
Minnhybrid 800	85	.....	53.6	45.8	41.4	31.8	34.2	28.6	27.1	27.5	58.6	7	2	29	
Rainbow (Mandan)	90	43.1	56.9	44.4	44.5	37.5	40.2	35.4	30.6	31.4	77.0	25	6	16	
Wis. hybrid 355	95	44.8	54.6	49.8	.....	.....	.....	.....	.....	.....	.....	5	2	32	
Wis. hybrid 416	98	46.2	.....	50.0	.....	.....	.....	.....	.....	.....	.....	4	2	33	
Minnhybrid 602	98	46.3	.....	50.4	.....	.....	.....	.....	.....	.....	.....	3	1	32	
Wis. hybrid 464	100	46.3	.....	47.3	.....	.....	.....	.....	.....	.....	.....	2	2	33	
Sig. diff. at 5%		2.6	2.4	2.7	2.0	2.2	1.9	3.0	.....	4.4	3.7				
1947-1948 average yield (2 year average)															
Nodakhybrid 301	83	42.6	62.4	48.2	.....	35.0	.....	.....	.....	.....	.....	4	2	30	
Minnhybrid 706	90	.....	.....	53.8	.....	.....	.....	.....	.....	.....	.....	4	3	34	
Sokota 204	95	41.1	.....	40.6	.....	.....	.....	.....	.....	.....	.....	4	4	32	
Wis. hybrid 355	95	40.6	58.5	45.4	.....	29.1	.....	.....	.....	.....	.....	5	2	34	
Wis. hybrid 341	95	43.3	60.3	48.3	.....	32.8	.....	.....	.....	.....	.....	5	3	33	
Minnhybrid 607	100	45.4	.....	46.0	.....	.....	.....	.....	.....	.....	.....	4	1	34	
Minnhybrid 608	100	45.6	.....	46.8	.....	.....	.....	.....	.....	.....	.....	2	1	35	
Sig. diff.		4.5	3.2	3.8	.....	3.2	.....	.....	.....	.....	.....				

Table 3—Comparison of Nodakhybrid 208 and Nodakhybrid 304 in yield, lodging and ear height with older varieties or hybrids. Varieties arranged in order of relative maturity (R.M.).

Variety	N. Dak. R.M. days	Eastern Area			Central and Western Area					Weighed comparative averages			
		Maple- ton 1946- 1948	Fargo 1946- 1948	Lari- more 1946- 1948	Edge- ley 1944- 1948	Bis- marck 1944- 1948	Minot 1945- 1948	Dick- inson 1944- 1948	Williston D.L. 1944- 1948	Irr. 1946- 1948	Lodg- ing %	Smut %	Ear height inches
<b>Bushels per acre</b>													
Dakota White	75	.....	.....	.....	.....	.....	30.7	23.2	28.4	.....	44	3	8
Falconer	80	.....	39.9	.....	31.0	38.4	34.6	30.8	32.1	57.9	37	3	12
Nodakhybrid 203	80	51.1	41.6	37.8	31.0	34.3	25.8	21.6	29.0	54.3	11	2	21
Nodakhybrid 208	81	55.7	45.9	40.9	35.6	41.4	35.5	32.3	33.9	61.3	21	2	19
Nodakhybrid 201	82	53.6	44.7	39.8	33.8	38.3	29.4	27.9	28.9	56.3	14	2	24
Wis. hybrid 240	82	.....	42.8	38.9	34.6	38.0	30.6	27.7	29.0	55.1	16	2	23
Nodakhybrid 304	83	55.1	45.3	42.1	36.5	40.3	32.7	29.6	31.2	64.7	5	1	24
Nodakhybrid 301	83	60.1	51.4	43.0	35.5	39.1	33.1	32.4	32.7	56.3	4	1	25
Minnhybrid 801	83	.....	44.2	.....	.....	35.0	.....	.....	.....	.....	9	2	26
Wis. hybrid 255	83	.....	46.6	37.0	31.0	36.9	.....	.....	.....	.....	9	3	26
Minn. 13 (Haney)	85	51.0	42.7	36.7	28.4	36.0	26.0	23.4	24.3	47.5	22	4	23
Wis. hybrid 279	85	58.4	47.5	39.5	32.4	39.2	29.1	26.3	29.3	55.8	6	2	26
Minnhybrid 800	85	55.3	44.2	39.0	30.4	35.7	28.6	27.1	27.5	47.1	8	2	29
Rainbow (Mandan)	90	56.7	42.9	41.0	35.4	42.1	35.4	30.6	31.4	64.0	26	6	16
Sig. diff. at 5%		3.0	3.7	2.4	2.4	2.1	3.0	.....	3.6	3.9			

early maturing hybrids not only mature better but also may yield higher. The purpose for which the corn is grown also determines which variety is best adapted. For ear corn production corn must mature well, have a low moisture content in order to permit safe storage and produce well filled deep kernelled ears. For silage or fodder production, somewhat later maturing strains which produce well developed ears and a high yield are more profitable. Too frequently a yield comparison, in wagon loads, is made between tall growing, late maturing, large and high moisture bulky corn and the early maturing, dry ear corn. This erroneous comparison, however, is to a large extent leveled off when the yield comparison is based on the uniform moisture content. Furthermore, the bulky high moisture content corn does not store safely.

The size of the corn seed is not an index for yield capacity provided it germinates high, is graded properly and can be planted accurately. Some hybrid seed is small, particularly Nodakhybrid 301, by the nature of its foundation parents. Other hybrid seed is large and may or may not germinate high. A bushel of high quality small grade seed corn will plant more land than a bushel of large grade seed. The true test of a good corn seed lies in the ability to germinate and produce a good stand and vigorous seedling growth.

#### Performance of Varieties in Different Maturity Zones

In the summary Tables 2 and 3, more recently released Experiment Station hybrids, Nodakhybrid 301, Nodakhybrid 208, and Nodakhybrid 304, are compared with the older standard hybrid varieties in maturity, yield, lodging, smut, and ear height. The results from trials up to 1944 inclusive, were reported in the Bimonthly Bulletin Vol. 7, No. 4. The performance of a large number of commercial seedmen varieties, in 4 maturity zones, is reported yearly and in greater detail in the Hybrid Corn Field Trial report.

Some currently available hybrid varieties are superior to the comparable open-pollinated varieties in one, or many characters. Each individual character, however, determines in which area and for what purpose a variety is best adapted. The North Dakota relative maturities (R.M.), as assigned in Table 2 and 3, were obtained from the average silking date, actual visual maturity, and the moisture content in ears at harvest. They are comparative, placing varieties in their relative position with respect to maturity. Even though seasonal variations in maturity are common, the relation of one variety to another does not change materially. The performance and adaptability of different hybrids in 5 North Dakota maturity zones are as follows:

**Southeastern area, 92 to 102 day, Zone 1, (Fig. 1),** trial near Barney Wyndmere area in Richland county show that 95 to 100 day R.M. hybrids yielded higher than 85 or 83 day R.M. hybrids. In this zone still later maturing hybrids yielded high in selected fertile fields and in years when the growing season was very favorable. This yield advantage of late maturing hybrids, however, was too frequently offset by the lack of maturity in years when the growing

season was unfavorable. Earlier maturing hybrids 83 to 85 day R.M., on the average, yielded slightly less but matured better and produced higher quality corn.

**The results in the 85 to 92 day, Zone 2,** trials at Mapleton and Fargo in Cass county, show that hybrids from 85 to 90 day R.M. not only yielded as high or higher but also matured better than those of 95 or 100 day R.M. rating. Other earlier hybrids from 82 to 83 day R.M. produced good yields of dry and high quality corn. The 95 day R.M. or later maturing hybrids did not mature satisfactorily in 5 out of the past 8 years. In the above designated 85 to 92 day zone 2 and 92 to 102 day zone 1, good hybrids yielded from 18 to 28 percent higher and also were more resistant to lodging and diseases than open-pollinated Haney strain of Minnesota 13.

**In the 83 to 85 day maturity, Zone 3,** trials at Larimore in Grand Forks county and Edgeley substation in LaMoure county, 83 day R.M. hybrids, represented by Nodakhybrids 301 and 304, on the average, matured satisfactorily and yielded high. Earlier hybrids of 81 to 82 day R.M. matured every year and yielded high when the season was short or unfavorable. While the hybrids of 85 day R.M. rating yielded high in favorable growing seasons, they did not mature satisfactorily and yielded low in unfavorable seasons. Mandan strain of Rainbow flint yielded high but it was late maturing, low eared, had tendency to lodge in adverse seasons, and therefore its best use is for fodder and silage production. Good early hybrids not only yielded from 10 to 15 percent higher but were more resistant to lodging and diseases than open-pollinated Minnesota 13 variety.

**A large area in Central and Western part of the State, 80 to 83 day, Zone 4,** is represented by the trials at Bismarck, Minot, Dickinson, and Williston. In this zone 80 to 82 day R.M. hybrids matured every year, yielded satisfactorily, and had higher ears, were more resistant to lodging, and in most cases ears dried more rapidly than Falconer. Falconer was early maturing and a good yielder but the ears were too low, plants lodged and broke down severely under adverse conditions and when harvested with a mechanical corn picker from 10 to 30 percent of the ears were not recovered. Nodakhybrids 301 and 304 yielded high and were highly resistant to lodging but they were of 83 day R.M. or the latest corn that mature safely in an average growing season in this western area. Still later corn, 85 day R.M. matured satisfactorily and yielded high only in the very favorable seasons. Rainbow flint (Mandan strain) yielded high but it was late, lodged readily, was tight husked, and many ears were too low for efficient mechanical picking, therefore its best use in this area is for fodder or silage production. When hybrids are compared with the widely grown Falconer variety in this western zone the advantages of early maturing hybrids are: higher ears, greater resistance to lodging, and more uniformity in height, all of which contribute to the efficient use of corn harvesting machinery.

**In 80 day or less maturity, Zone 5,** only the earliest hybrids and varieties are adapted. Most dependable open-pollinated varieties in this extreme northern zone are very early Dakota White flint, Falconer, and Northwestern semi-dent. Very early maturing hybrids Nodakhybrid 203, 208, 201 and Wis. hybrid 240 or comparable commercial hybrids have matured and yielded satisfactorily in favorable seasons.

### Comparative Description of Corn Varieties

A brief comparative description and recommended use of corn varieties tested in the experiment stations and outlying trials are given below. Some corn hybrids, sold under different commercial trade names, are produced from the same foundation seed stocks as the recommended experiment station hybrids and are **similar** to the experiment station hybrids. These differ only in seed quality resulting from the care given during the seed production processes which include isolation, detasseling, harvesting, drying, shelling and grading. Other commercial hybrids, however, have an entirely different origin but are **comparable** in maturity, yielding capacity, resistance to lodging and other agronomic characters. The North Dakota relative maturity (R.M.) is based on the date of silking, visual field maturity and moisture content in ears at harvest. This assigned maturity may differ a few days from the maturity days given on the seed tag.

**Dakota White—70 to 75 day R.M.:** Very short suckering plants, very low ears, lodges extensively and breaks down when mature. Hard white flint kernel, dependably fair yielder in western and northern areas, zones 4 and 5, where it is grown for fodder, early pasture and hogging-off purposes. Because of low ears and plant breakage it can not be harvested efficiently with the mechanical corn picker.

**Gehu—70 to 75 day R.M.:** Yellow flint otherwise similar to Dakota White.

**Falconer—80 day R.M.:** Short suckering plants, many ears are too low, lodges extensively and breaks down when fully mature resulting in a considerable ear loss when harvested with a mechanical picker (for grain). Slow ear drying because of tight husk, good yielding capacity and dependable yellow semi-dent variety, extensively grown for fodder, pasture and grain production in the western zone 4 and northern zone 5. Adapted for early pasture and fodder production (when cut on the green side) in central, western zone 4 and northern zone 5.

**Nodakhybrid 203—80 day R.M.:** Taller non-suckering plants, higher ear, higher lodging resistance, looser husk, and more rapid ear drying than Falconer. Fair yielding, good yellow dent kernel. Because of fair lodging resistance, higher ear, and rapid drying of ears, it is best adapted for grain production in zone 4 and 5 or where very early yellow dent corn is needed.

**Similar commercial hybrids:** Agsco 203, Magill 813, Newday N3.



**Nodakhybrid 208—81 day R.M.:** A cross between Falconer lines and yellow dent lines. Taller plant, higher ears, less lodging and breaking of plants than Falconer but yet it has tendency to lodge, long ear shank and somewhat medium tight husk. Deep kernal, yellow dent, early maturing and high yielding capacity in zone 4. Best adapted for early pasture in 83 to 85 day zone 3 and 85 to 92 day zone 2 and for grain and fodder production in 80 to 83 zone 4 and 80 day zone 5. Only a small amount of seed was produced in 1948.

**Nodakhybrid 201—82 day R.M.:** Fair plant and ear height, medium lodging resistance. Yellow dent of fair to good yielding capacity. Adapted for grain production in short season areas where moisture is adequate. Newday N11, and Haapala 280 are similar.

**Wis. hybrid 240—82 day R.M.:** Yellow dent-flint hybrid with semi-dent to flint kernel, otherwise comparable to Nodakhybrid 201. Adapted for grain production in zones 3, 4 and 5. Magill 810, Jacques 803, Newday NF 10, Pride D1 are similar.

**Nodakhybrid 304—83 day R.M.:** Yellow dent-flint hybrid. Leafy, medium plant and ear height, good lodging resistance, yellow semi-dent kernel, high yielder particularly in cool growing seasons in zones 3 and 4. Newday NF 12 is similar. Kingscrot KF 1, KF 5, KF 7 are comparable dent flint-hybrids.

**Nodakhybrid 301—83 day R.M.:** Good emergence and seedling growth in cool soil, good plant and ear height, very good lodging resistance, yellow dent kernel and high yielding capacity. This hybrid is adapted to a wide range of conditions. It has been a high yielding early maturing hybrid in the 85 to 92 and 92 to 102 day zones 1 and 2. High yielding of medium maturity in the 83 to 85 day zone 3 and high yielding semi-late maturity in 80 to 83 day zone 4. Because of good standibility and good picking quality it is particularly adapted for grain production. Agsco 301, Magil 828, Newday N 21, Jacques 851 are similar.

**Wis. hybrid 255—83 day R.M.:** Tall plants, high ears, good lodging resistance, fair yielding capacity, yellow dent. Adapted to eastern zones 2 and 3. Jacques 802, L.O.L. 80, Haapala 270 are similar. Kingscrot KE 3, United U 20, Minhybrid 801 are comparable.

**Minnesota 13 (Haney strain)—85 day R.M.:** Tall plants, high ears, moderate lodging, good quality yellow dent kernel, low yields. Grown for grain production in Eastern and better growing areas in central parts of the State. Boyd and Alta strains are similar.

**Wis. hybrid 279—85 day R.M.:** Tall plants, high ears, good lodging resistance, tendency for tight husks, good quality yellow dent kernel, high yielding capacity. Adapted for grain production as semi-early hybrid in zone 1, mid-early in zone 2 and semi-late in zone 3. Magill 825, Agsco 279, Newday N 22, Pride B 3, Pride B 3 A, Jacques 852, United U 22 are similar.



**Minhybrid 800—85 day R.M.:** Tall plants, high ears, good lodging resistance, yellow dent kernel, good grain yields in fertile soils and good growing conditions in eastern North Dakota zones 1 and 2. Agsco 800, L.O.L. 85 are similar. Kingscrosst KE 2, Haapala 854, Jacques 854, Cargill 85 N, Wis. hybrid 275, Master F 21 are comparable to Wis. hybrid 279 and Minhybrid 800.

**Rainbow flint (Mandan strain)—85 to 90 day R.M.:** Suckering plants, poor lodging resistance, long tight husk, heavy shank, some ears are low, mixed colored flint, high yielding capacity in zone 3 and zone 4. High yielding variety, best use for fodder or silage production. Funks G 185—yellow flint is comparable.

**Minhybrid 706—90 day R.M.:** White dent hybrid. Tall plants, high ears, good lodging resistance, high yielding white dent in eastern parts of zone 1 and zone 2.

**Yellow dent hybrids of 90 day R.M.:** Kingscrosst KE 1, Kingscrosst KH, Funks G 17, Funks G 40, Funks G 11, Funks G 8, L.O.L. 90, DeKalb 41, DeKalb 43, DeKalb 46, United U 2.

**Wis. hybrid 355—95 day R.M.:** Tall plants, high ears, good lodging resistance, good quality yellow dent. High yielding capacity on the light texture soils in the southeastern parts of zone 1 where it is grown for grain production. Magill 900, Agsco 501, Newday N 31, Pride B 17 are similar. DeKalb 56, Wis. hybrid 341, Kingscrosst KA 4, Magill 902, Haapala 400, Haapala 400 A, Sokota 204, Funks G 188, Funks G 187, Funks 35, Pride B 17 A, P.A.G. 35, and Cargill 90 N are comparable.

**Wis. hybrid 416—98 day R.M.:** Tall plants, high ears, good lodging resistance, yellow dent, high yielding capacity. Used for grain production on the light texture fertile soils and in good corn growing areas of Zone 1. Newday N 37, Jacques 957 are similar. Master F 60 A, Newday N 35, United U 22 R, Jacques 901, Pride B 23, Funks G 18, Funks G 19, Jacques 956 J, and Minhybrid 602 are comparable.

**Very late yellow dent hybrids** listed below may be grown for grain production in sandy, fertile soils and under good growing conditions in Zone 1.

**100 day R.M.:** Minhybrid 607, Minhybrid 608, Agsco 607, Kingscrosst KS 2, DeKalb 62, DeKalb 63, Pride B 36, Funks G 177, Cargill Y 67, Jacques 1003 J, Cornell 29-3.

**105 day R.M.:** Master F 82, L.O.L. 100, Funks G 39, United U 26 R, DeKalb 65, P.A.G. 56.