BETWEEN THE ROWS

January 19, 2012 | STARTING WITH THE RIGHT PLANT POPULATION | ISSUE: 21

Background

An essential part of your spring crop management plan is determining hybrid selection and planting rates.

Over the past several decades, increased plant population has been one of the major agronomic management factors responsible for the USDA-reported corn yield increases. Yields have increased because of more plants per acre rather than more grain per plant.

Optimum plant population depends on factors such as hybrid, moisture, stress level, soil fertility and yield goal. It is a balance between maximizing the use of available light energy and soil moisture without causing excessive interplant competition that might impact yield or standability.

The optimum plant population is not the same every year and varies by region, season and field. Because of this variability, growers typically consider their planting conditions and hybrid to plant with a final population range in mind.

The Optimum Range

Research is critical for identifying the correct population for each grower's specific conditions. Plant populations have increased the past couple decades at a rate of about 400 plants per acre per year. It's clear that high populations and hybrid selection are key factors in obtaining high yield levels. The key is to find the point of diminishing returns, which can be manipulated by management considerations.

When reviewing university yield trials (IA, IL, MN) that examined hybrid performance at various populations, each university reported a similar optimum population range. On average, maximum grain yield was reported to occur in a range between 34,500 and 37,000 plants per acre.

The Iowa State University Agronomy Extension study and chart will be used to illustrate the range of optimum populations (Chart 1).

Over 3 years of hybrid performance evaluation, a wide range of maximum grain yield was reported. One population did not give the highest yield every year. Each growing season, hybrid and field conditions will impact the optimum population. But when averaged over the test conditions, the optimum population was reported as 36,000 plants per acre. This population is 2000-3000 plants per acre higher than previous plant population research. Because the corn crop is subjected to a wide range of conditions in any year, the field population should be targeted to fall within the optimum range so maximum yield is possible in most years.

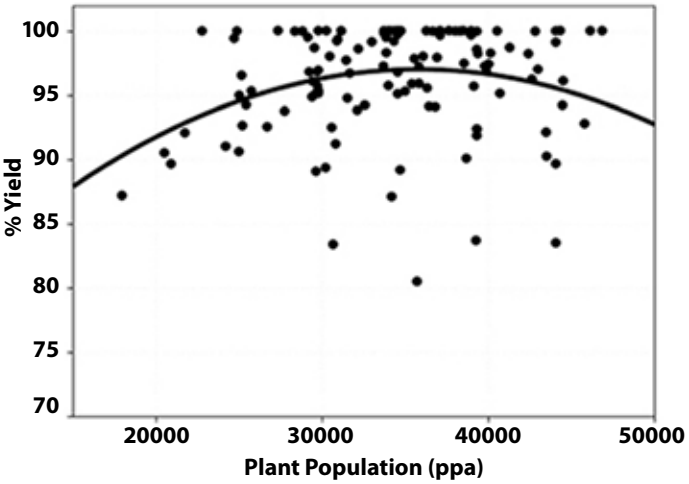

Chart 1 – Iowa State University Extension 3-year summary reporting yield at different populations

The optimum plant population is the actual plants at harvest, which is different than the planted population (actual kernels per acre planted). To establish the stand within the desired range, the planter needs to be set to plant a higher number of kernels in order to account for about 4-7% stand loss. So increasing the seeding rate by 5% over the desired stand, for example, may insure the proper plant population is achieved. If planting early into cold soils or into a rough seed bed, then increasing the seeding rate by 10% may be needed in order to achieve the desired stand. Growers typically evaluate field conditions and can adjust rates when field conditions change or when hybrids or field productivity changes.

Wyffels research evaluates plant populations to determine the optimum population for different hybrids. It's also important to understand newer hybrids' ability to handle increased populations. New corn hybrids are routinely evaluated at 38,000 plants per acre in replicated yield trials. These new hybrids are the result of corn breeding selection also done at high plant populations. With improved tolerance to high populations there is also better overall stress tolerance and stalk quality.

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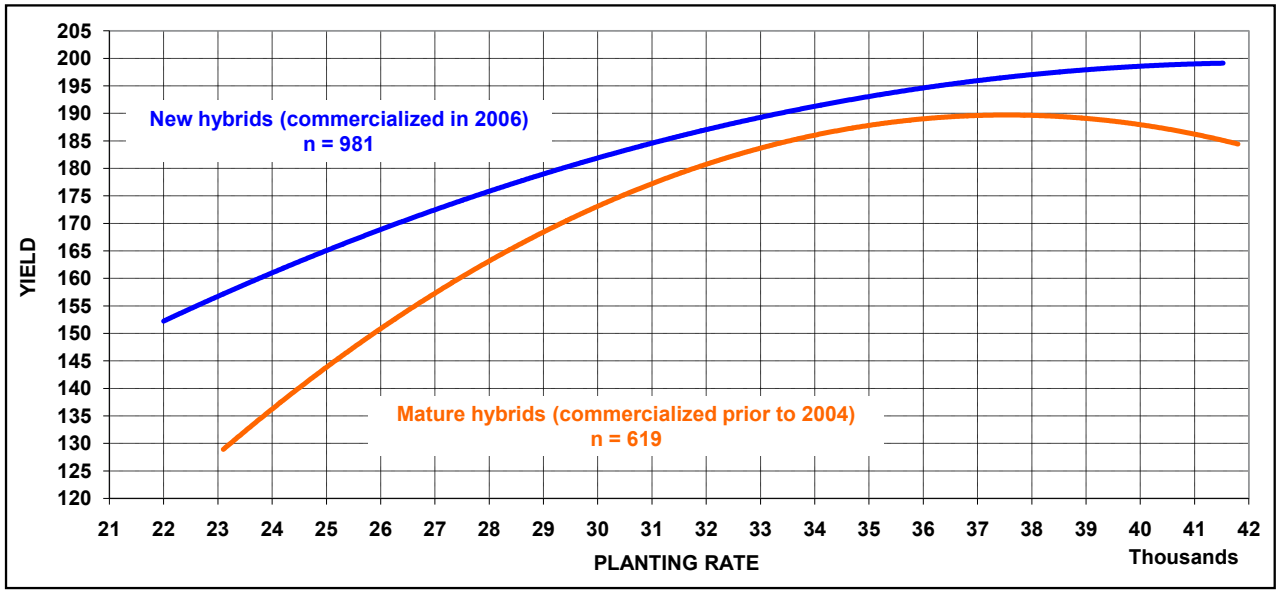

Chart 2 – Wyffels research yield data comparing older hybrids to newer hybrids in yield response to plant population.

Chart 2 compares the performance of a set of ten new hybrids to a set of ten older hybrids. The newer hybrids can handle higher populations and have higher overall yield potential than older hybrids regardless of population.

Hybrid Adaptability and Targeted Final Stands

The planting guidelines chart lists agronomic adaptability ratings and targeted final stands of Wyffels hybrids based on soil productivity level (Chart 3).

The agronomic adaptability ratings focus on cropping pattern and general soil texture. Hybrids highly recommended for continuous corn are rated HR. Soils with higher clay content, higher organic matter and possibly slower internal drainage are called heavy soils. Medium soils are silt loams and other closely related soils with good organic matter and generally good internal drainage. Soils with lower clay content, higher sand content, lower organic matter and very good internal drainage or drought prone are categorized as light soils.

Choose your field conditions and select hybrids suitable for those environments. The productivity level can be based on either corn suitability rating, field history, or past yield performance.

The target final stands are recommended as a range, and some overlap of ranges allows flexibility of specific field conditions. To insure the desired stand is achieved, the planter should be set to increase the planting rate 5-10% to allow for stand loss depending on the actual planting conditions.

Management recommendations

Hybrids used today are developed, tested and perform best at high plant populations.

Growers with productive conditions and high management inputs can take advantage of the productivity of these hybrids by planting recommended populations for their field conditions. With recent strength in corn prices and growing demand for grain, it makes economic sense to capture maximum yield potential from every corn acre. Targeting the optimum plant population for each field is critical to this endeavor.

Many growers may not be planting a high enough rate to obtain the targeted stand. Stand loss from planting to early vegetative growth can average 4-7%. Conditions like planting early into cold soils or cloddy soil conditions may cause stand loss of 10% or more depending on conditions.

Calculate the stand loss from your planter setting and consider several loss estimates before finally determining actual planting rate.

Starting with the right plant population is an important tool corn growers have for maximizing performance. Don't let plant population be your limiting factor. Control this aspect of corn production management and you'll be rewarded with high yields.

Chart 3 – Planting guidelines based on cropping pattern, soil texture, and field productivity.

					TARGETED FINAL STAND †		
HYBRID	CONTINUOUS CORN	LIGHT SOILS	MEDIUM SOILS	HEAVY SOILS	HIGH	PRODUCTIVITY LEVEL MODERATE	LOW
W1687	HR	G	E	E	34-38	31-35	30-34
W1721	R	G	E	VG	32-35	31-33	30-32
W1831	R	E	E	VG	34-38	31-35	30-34
W1912	R	G	E	VG	34-38	32-36	30-34
W1917	R	G	E	VG	34-38	32-36	30-34
W1940	HR	VG	E	VG	32-36	30-34	28-32
W1941	HR	VG	E	VG	32-36	30-34	28-32
W1953	HR	G	E	VG	33-36	31-34	30-33
W2680	R	VG	E	VG	32-36	30-34	28-32
W2681	R	VG	E	VG	32-36	30-34	28-32
W2757	HR	VG	E	VG	33-36	31-34	29-32
W2849	HR	E	E	VG	34-37	32-35	30-33
W3127	R	VG	E	G	34-38	31-35	30-34
W3730	HR	VG	E	VG	33-35	31-33	29-31
W4170	HR	VG	E	G	34-37	32-35	30-33
W4172	HR	VG	E	G	34-37	32-35	30-33
W4179	HR	VG	E	G	34-37	32-35	30-33
W4267	R	VG	E	G	34-37	32-35	30-33
W5051	R	VG	E	VG	33-36	31-34	29-32
W5072	R	VG	E	VG	34-37	32-35	30-33
W5077	R	VG	E	VG	34-37	32-35	30-33
W5078RIB	R	VG	E	VG	34-37	32-35	30-33
W5280	R	E	E	VG	34-37	32-35	30-33
W5281	R	E	E	VG	34-37	32-35	30-33
W5560	HR	E	E	VG	34-37	32-35	30-33
W6267	HR	F	E	G	36-39	34-37	32-35
W6440	HR	G	E	VG	33-36	31-34	29-32
W6526	HR	VG	E	F	33-36	31-34	29-32
W6870	R	E	E	G	31-35	29-33	27-31
W6871	R	E	E	G	31-35	29-33	27-31
W6876RIB	R	E	E	G	31-35	29-33	27-31
W6878RIB	R	E	E	G	31-35	29-33	27-31
W6917	HR	VG	E	VG	35-38	33-36	31-33
W6927	HR	VG	E	G	34-37	32-35	30-33
W7071	HR	VG	E	E	33-37	31-35	29-33
W7142	HR	VG	E	VG	33-36	31-34	29-32
W7146RIB	HR	VG	E	VG	33-36	31-34	29-32
W7147	HR	VG	E	VG	33-36	31-34	29-32
W7210	HR	E	E	VG	34-36	32-34	30-32
W7213	HR	E	E	VG	34-36	32-34	30-32
W7476RIB	HR	VG	E	E	33-37	31-35	29-33
W7477	HR	VG	E	E	33-37	31-35	29-33
W7800	HR	E	VG	VG	33-35	31-33	29-31
W7997	R	G	E	G	32-35	30-33	28-31
W8125	HR	VG	E	VG	33-36	31-34	29-32
W8430	HR	VG	E	VG	34-37	32-35	30-33
W8437	HR	VG	E	VG	34-37	32-35	30-33
W8680	HR	G	E	VG	32-35	30-33	28-31
W8681	HR	G	E	VG	32-35	30-33	28-31

R Recommended
HR Highly Recommended

E Excellent
VG Very Good
G Good
F Fair

† Increase the planting rate to allow for 5–10% stand loss.