AgriGold®
WE KNOW CORN

AGRIGOLD RESEARCH

Genetic Interaction in Twin Row Corn

2010 AGRIGOLD TESTING LOCATIONS

AgriGold would like to **thank** the participants for their cooperation in our 2010 Genetic Interaction in Twin Row Corn Study.

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Plain City, OH
Port William, OH
Union City, OH
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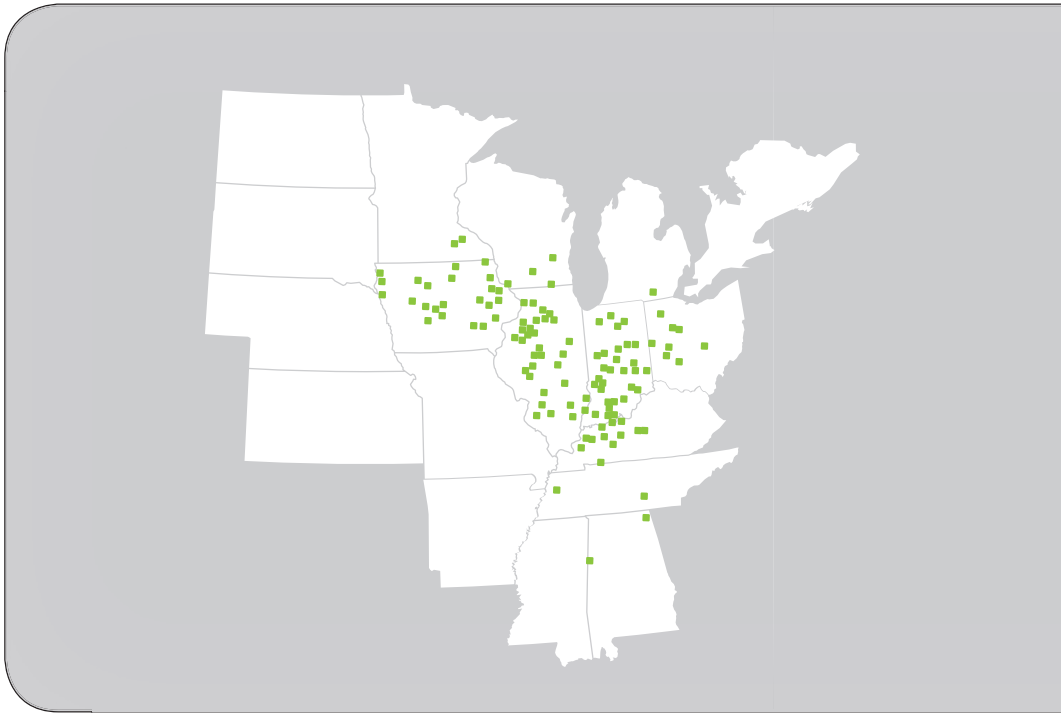
Hillsboro, TN
Darien, WI
Deforest, WI
Lancaster, WI
Waupun, WI



AGRIGOLD'S COMMITMENT TO INCREASING CORN YIELDS

Elevating genetic yield potential on every acre is the top priority at AgriGold. Different plant populations and row-spacing systems are two critical areas of interest that must be understood to achieve maximum yields. AgriGold's focus on genetic interaction between population, row spacing, different soil conditions and yield environments has lead us to continue our intensive row-spacing study in 2010. These principles provide AgriGold an understanding of how to maximize every acre.

FOUNDATION FOR ELEVATING CORN YIELDS

AgriGold's population and row-spacing research has identified four fundamental elements to elevate corn yields:

- Maximize every plant's genetic potential by population and row spacing
- Increase light interception & sugar production to drive yield growth
- Expand root mass & stalk diameter to utilize water and nutrient resources
- Improve ear-size consistency in order to stabilize performance

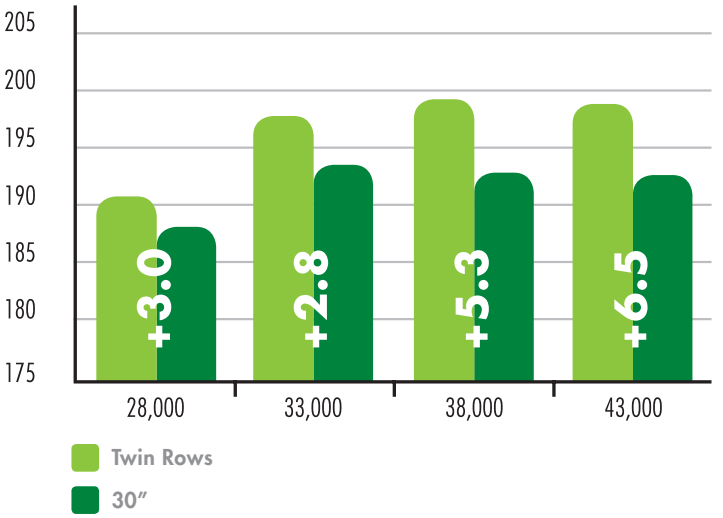
GENERAL THEORY ON INTER-ROW COMPETITION

The foundation of the study is to verify if positive yield and/or agronomic responses can be achieved with AgriGold's genetics planted at varying populations in different row spacings. The thought process behind the study is highlighted in the graph (left). The shapes represent a generalized description of plant-root mass and the amount of root competition there is under different row spacing. Reducing the amount of inter-row competition above and below ground allows the corn plant to maximize yield. The level of competition is directly related to population and row spacing. The project also allows AgriGold to evaluate 30″ rows to determine if planting population can be managed to limit the amount of competition the corn plant is under to enhance yield potential.

RESPONSE TO VARIOUS POPULATIONS AND ROW SPACING

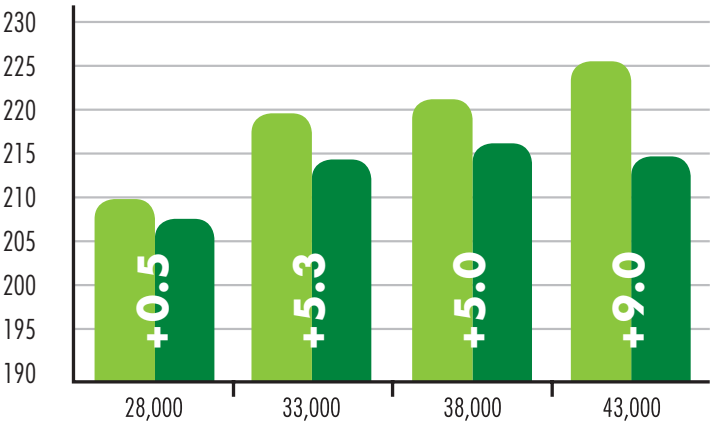
Compiled Yield Data For All Tested Hybrids

2010

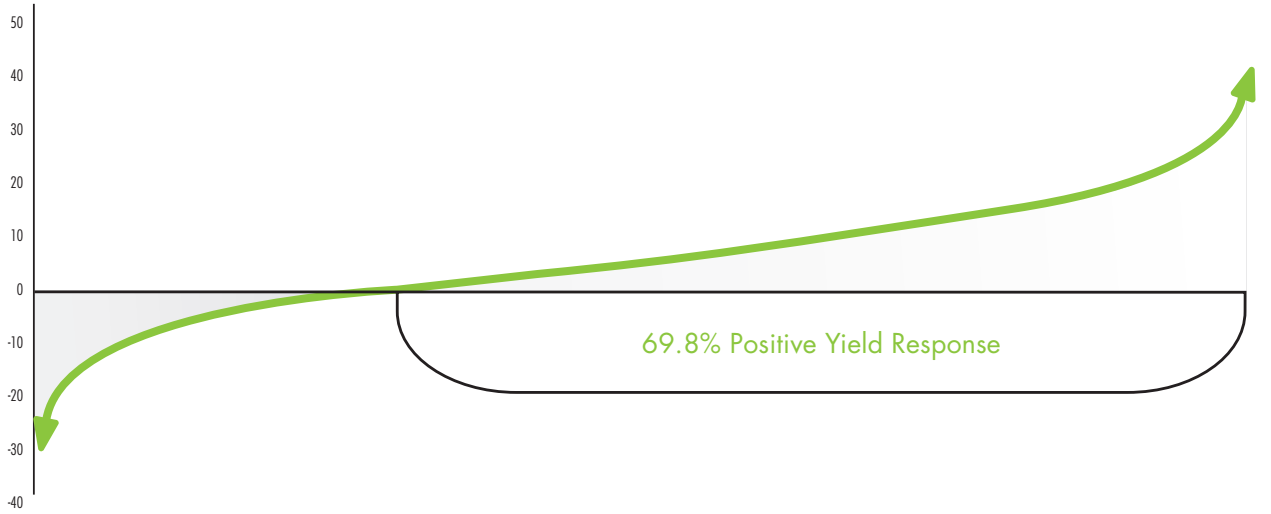


Compiled Yield Data For All Tested Hybrids

2009



TWO YEAR-SUMMARY

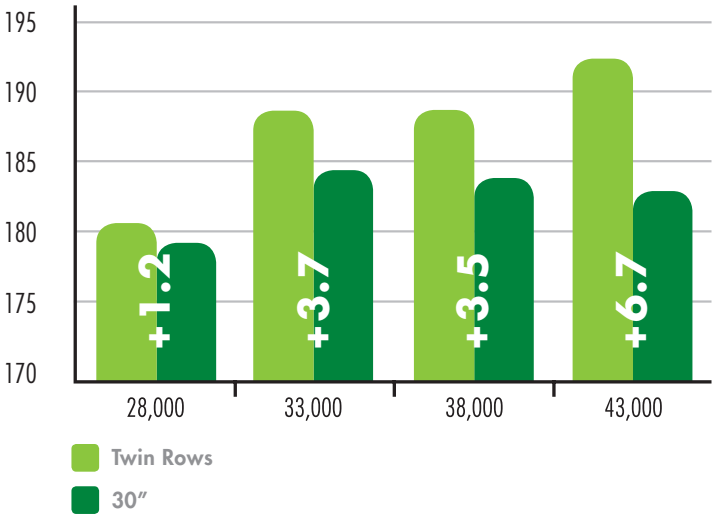


TWIN ROW RESPONSE VS 30"
1660 Paired Comparisons

2010 REGIONALIZED BREAKOUTS

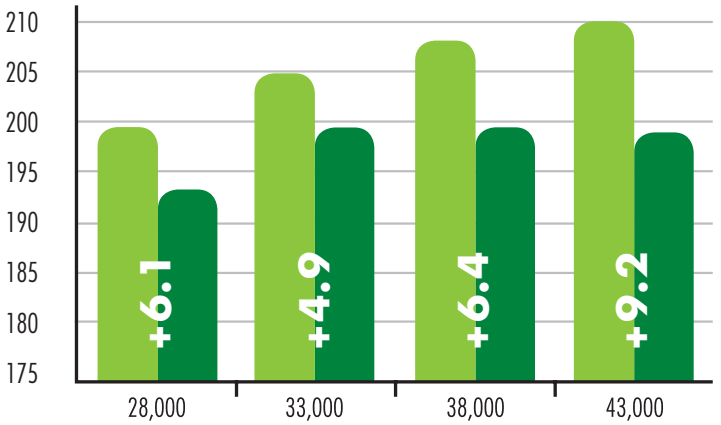
Compiled Yield Data For All Tested Hybrids

NORTHERN



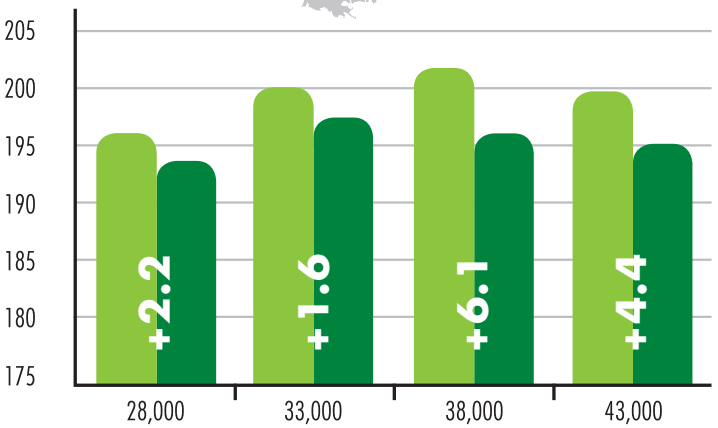
Compiled Yield Data For All Tested Hybrids

CENTRAL



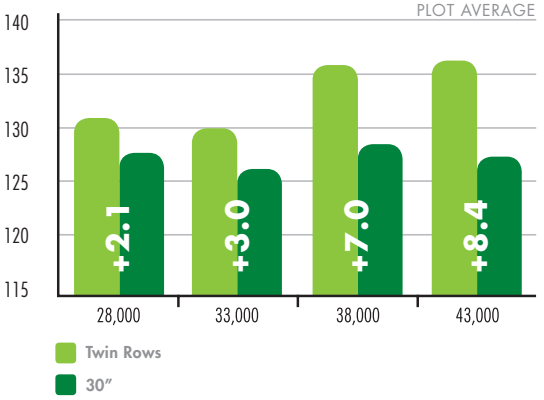
Compiled Yield Data For All Tested Hybrids

SOUTHERN



MATCHING POPULATION & ROW SPACING TO YIELD ENVIRONMENT

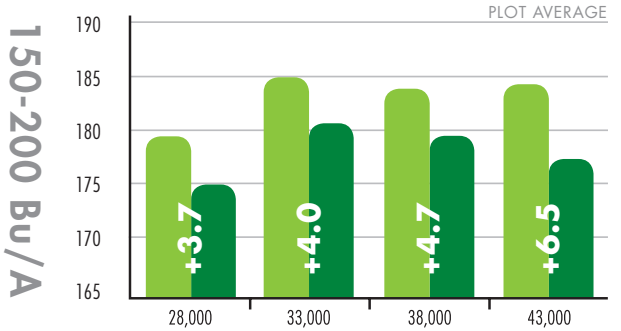
< 150 Bu/A



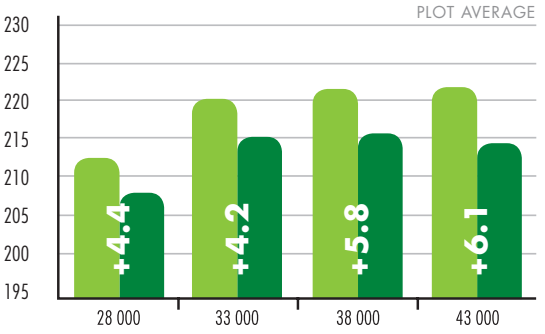
Data generated from yield environments less than 150 bu / acre exhibits several important concepts. Typically, population and row spacing are not the most limiting factors on yield in lower-yielding scenarios. Factors that do not typically limit yield include poor drainage, drought, low fertility, low pH, heat, and compaction, to name a few. For example, data generated from 30" rows showed basically no response to increasing populations over 28,000 ppa in low-yield environments. Narrow row systems, however, reduce inter-row competition and allowed additional rooting area to negate some of the yield-limiting factors associated with lower-yield environments in 2010. Nonetheless, focus should be directed toward reducing yield-limiting factors in low-yield environments and not necessarily population and row spacing.

150-200 Bu/A

Row spacing and population become larger-yield limiting factors compared to other factors listed above in 150-200 bushel yield environments. 30" row systems provide adequate rooting environments for populations to be increased based on overall yield potential. Data collected in 2010 would suggest a population of 33,000 may be optimum to maximize yields in both row systems at 150-200 bushel yield levels. However, the yield increase is greater in narrow rows due to less inter-row competition, greater light interception and increased nutrient uptake. Even though row spacing and population are critical at this yield level, there can still be other yield-limiting factors that do not allow corn genetics to express their full yield potential.

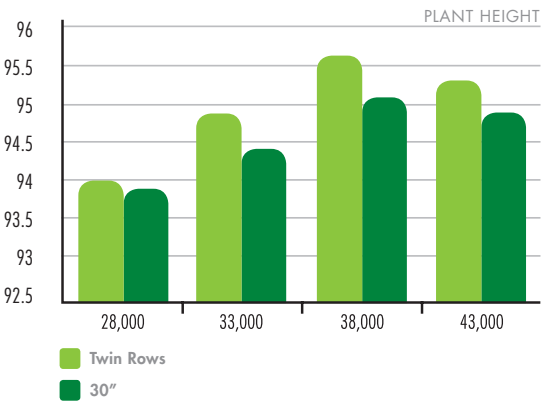


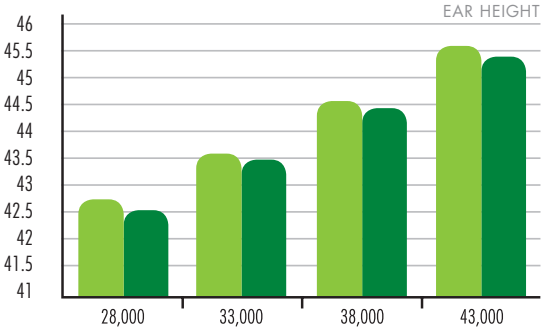
200+ Bu/A

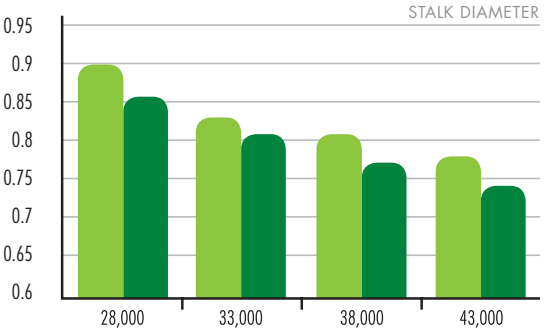


Most yield-limiting factors listed above are less common in yield environments above 200 bushel. Row spacing and population are key to maximize yields when considering competition for light and space between plants in high-yield situations. Data derived in yield environments above 200 bushel show a positive response to higher population in both row systems. In 30" rows, populations of 34-38,000 offered maximum yields in 2010. As populations increase above 38,000 in 30" rows, plants begin competing for rooting area, light, and available nutrients reducing yield potential. Narrow rows showed positive-yield gains up to 38,000 plants per acre. However, yield levels remained steady as populations were increased to 43,000. The yield increase can be explained due to additional room for plants to grow and utilize many necessary resources to maximize yield. Higher populations along with additional space between plants in narrow row systems compliment reduced-yield limiting factors in high-yield environments which allow genetics to reach maximum yield potential.

AGRONOMIC COMPARISONS OF HYBRIDS IN NARROW ROWS



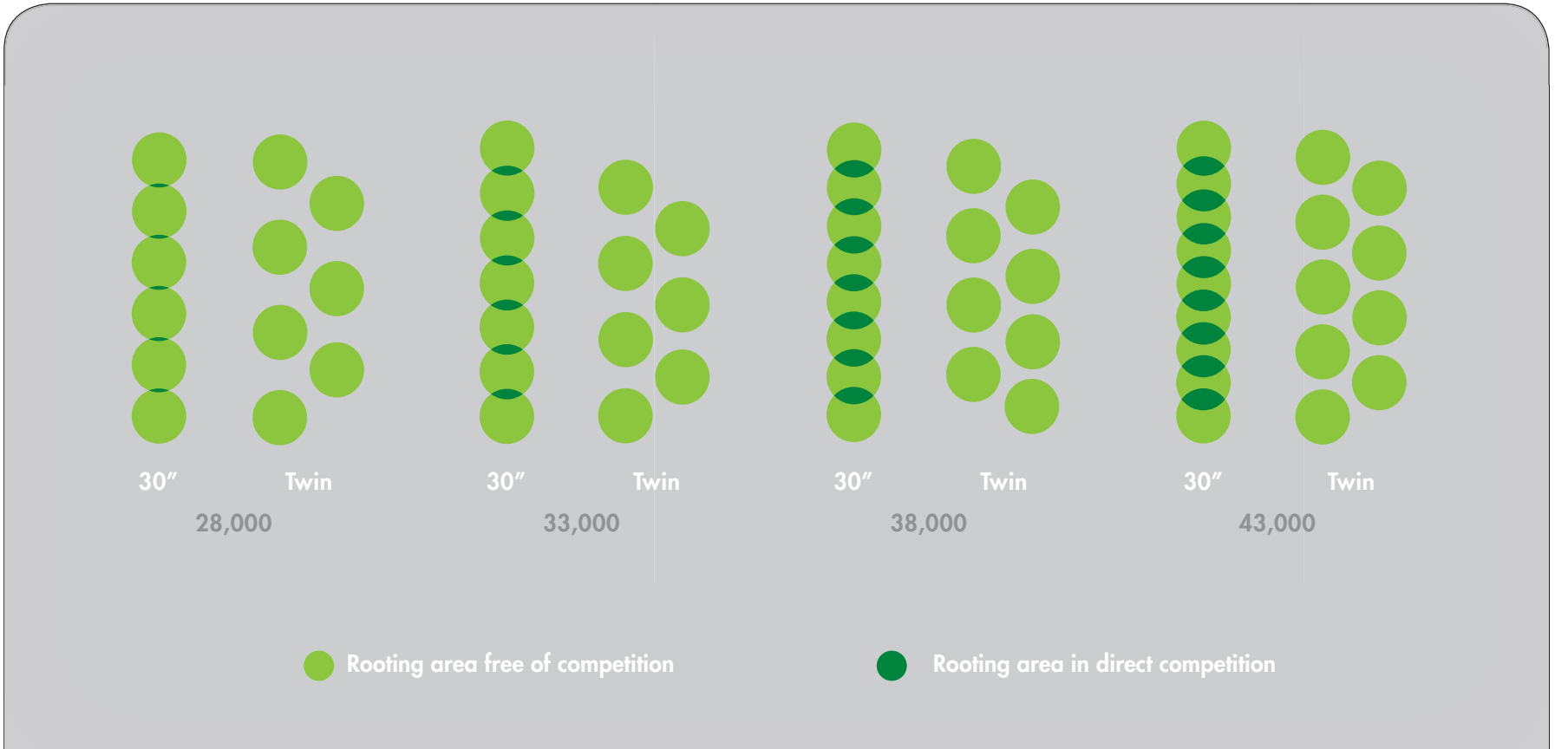




RESPONSE OF FAMILY B GENETICS TO VARIOUS POPULATIONS AND ROW SPACING

The response of Family B genetics under narrow row systems demonstrates how providing more room for each plant reduces inter-row competition. Less competition reduces stress, increases nutrient and water uptake, and essentially allows the ear to flex more and maximize yield. More equidistant spacing in a narrow row system allows Family B's to flex more at higher populations vs. 30" rows. A point of diminishing returns is reached when considering optimum plant population for Family B's depending on yield potential and row spacing. Optimum yields can be achieved around 34,000 for 30" row systems and 38,000 for narrow systems.

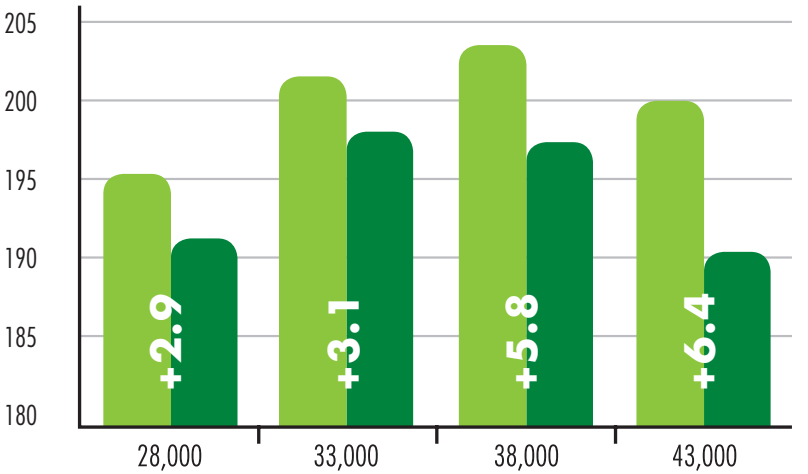
GENERAL THEORY OF CORN'S ROOTING HALO FOR DIFFERENT ROW SPACINGS & POPULATIONS



RESPONSE OF FAMILY B GENETICS TO VARIOUS POPULATIONS AND ROW SPACINGS

COMPILED YIELD DATA FOR ALL FAMILY B HYBRIDS

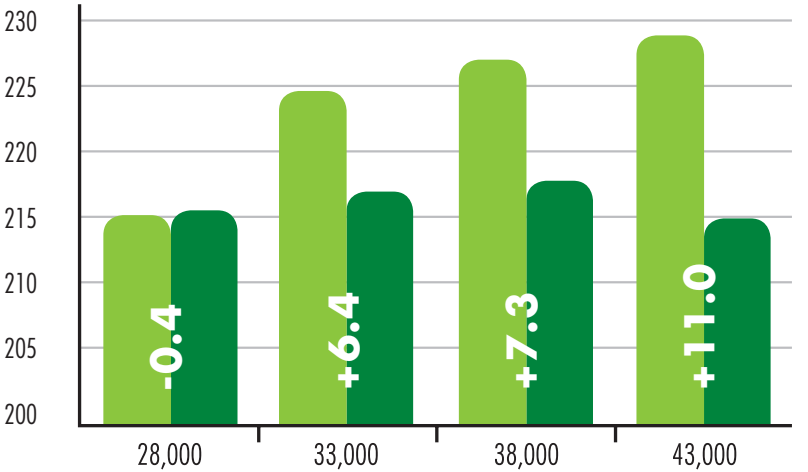
2010



Twin Rows
30″

COMPILED YIELD DATA FOR ALL FAMILY B HYBRIDS

2009



RESPONSE OF FAMILY F GENETICS TO VARIOUS POPULATIONS AND ROW SPACINGS

The response of Family F genetics under both row systems demonstrate how more ears per acre is the driving factor to increase yields with semiflexible genetics. Family F genetics are able to produce a larger "factory" in narrow row systems, however, their semiflex characteristics and their ability to withstand inter-row competition limit their overall yield response over 30" rows. This concept explains why Family F genetics require higher populations to maximize yield potential of a particular field.

NARROW ROW SYSTEM
AT 28,000

30" ROW SYSTEM
AT 28,000

CONSISTENT

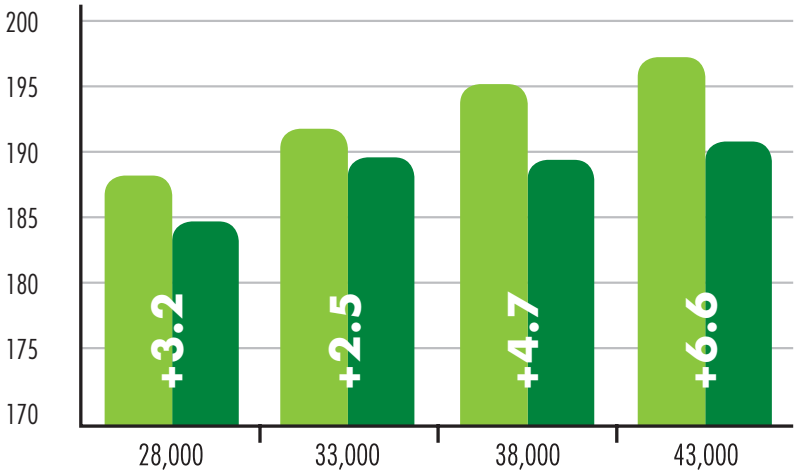
NARROW ROW SYSTEM
AT 38,000

30" ROW SYSTEM
AT 38,000

RESPONSE OF FAMILY F GENETICS TO VARIOUS POPULATIONS AND ROW SPACINGS

COMPILED YIELD DATA FOR ALL FAMILY F HYBRIDS

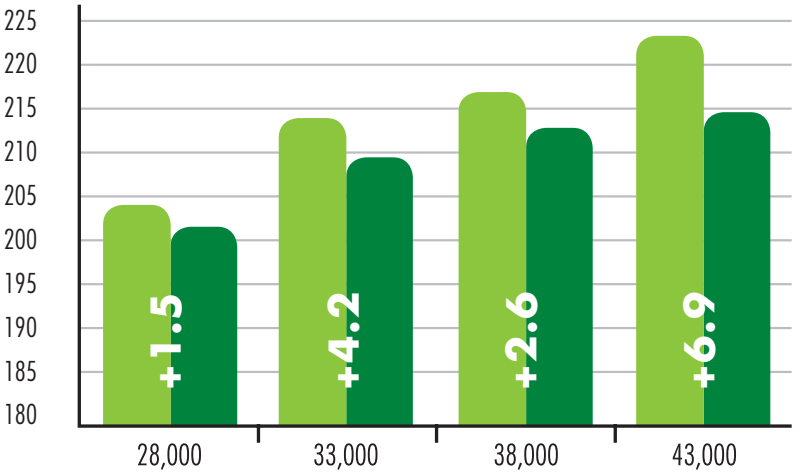
2010



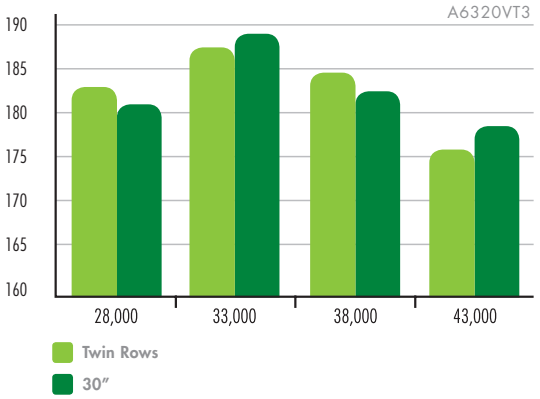
Twin Rows
30″

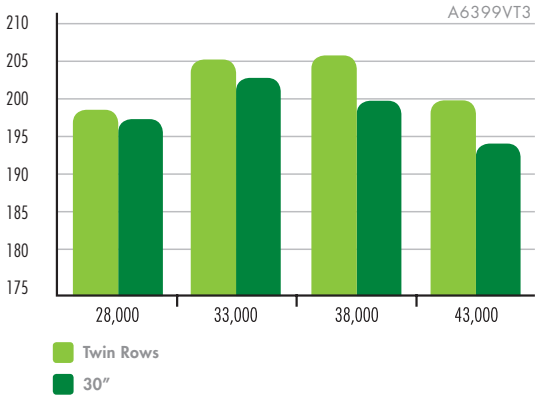
COMPILED YIELD DATA FOR ALL FAMILY F HYBRIDS

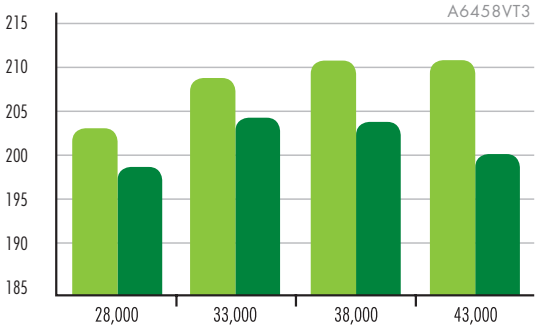
2009

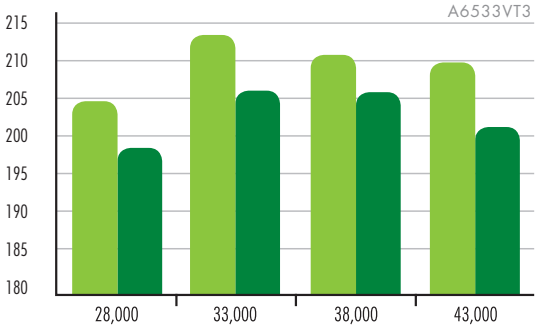


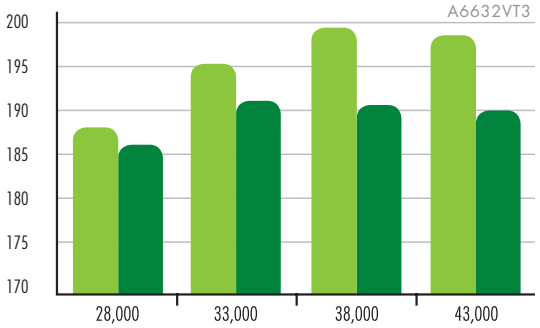
RESPONSE OF INDIVIDUAL FAMILY B HYBRIDS TO VARIOUS POPULATIONS AND ROW SPACING

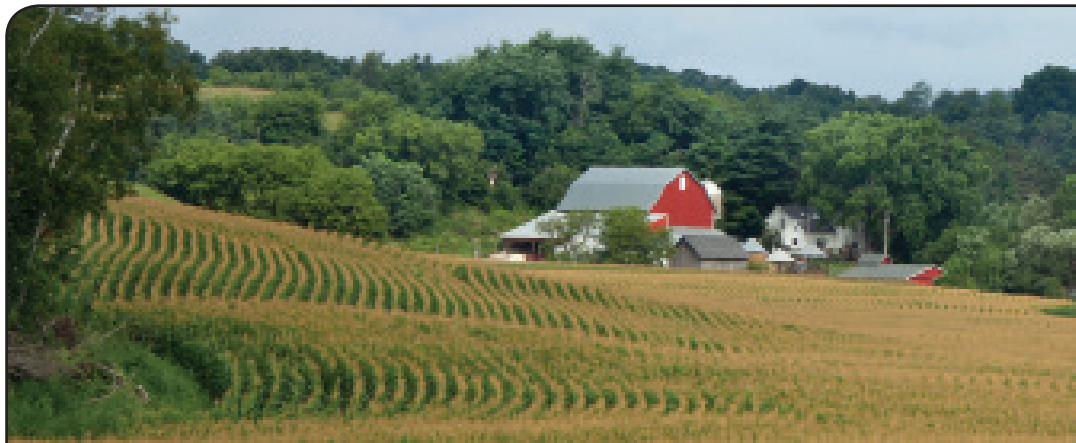




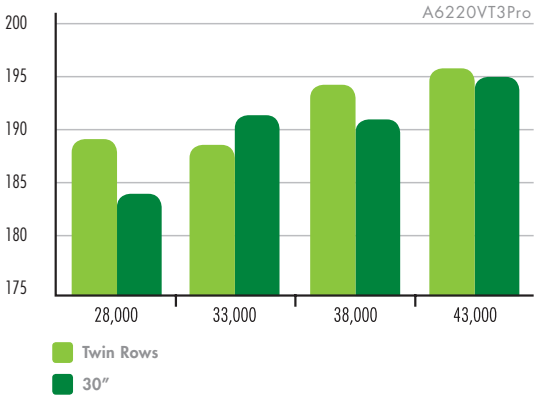


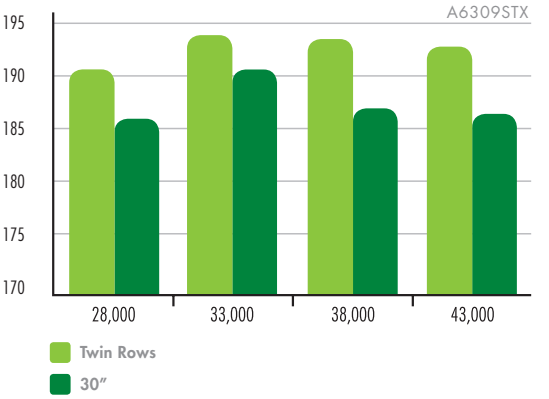


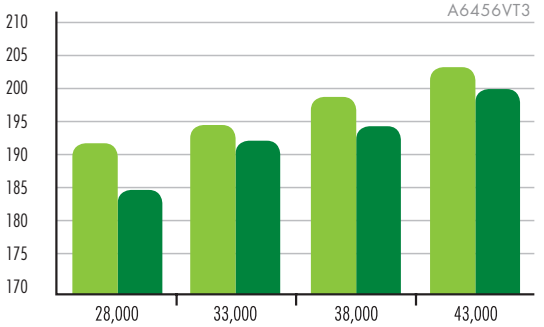


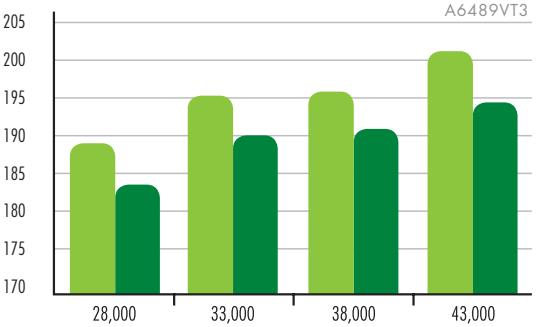


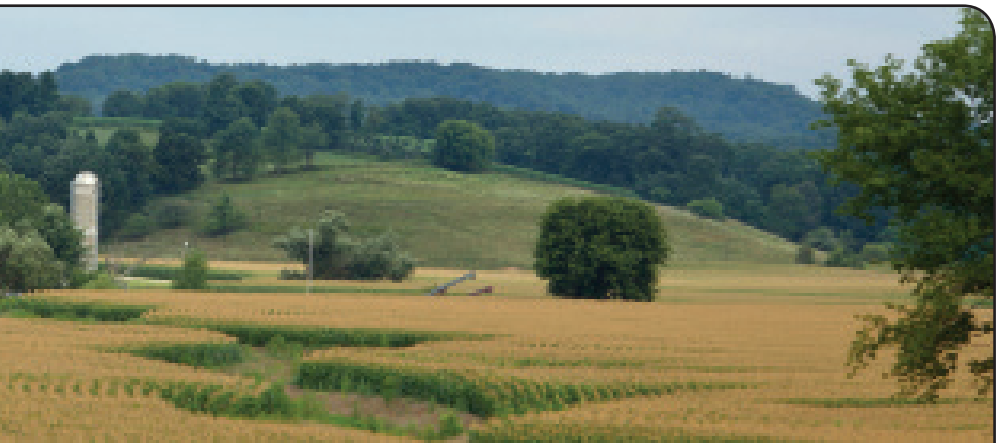
RESPONSE OF INDIVIDUAL FAMILY F HYBRIDS TO VARIOUS POPULATIONS AND ROW SPACING

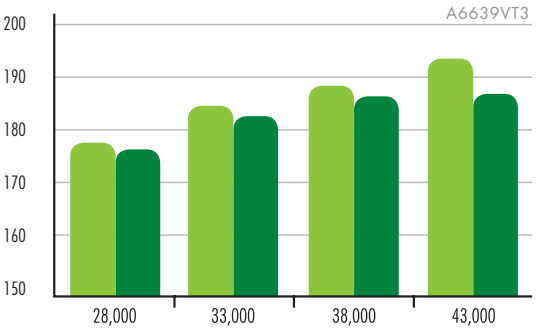












SUMMARY OF AGRIGOLD'S GENETIC INTERACTION IN TWIN ROW CORN STUDY

Two years of intensive study has allowed AgriGold to document that genetic differences do exist when comparing different populations and row spacing. The general trend of the study matches other studies done throughout the industry - higher populations drive higher yields if other yield-limiting factors are mitigated. AgriGold has identified differences in how genetics can be planted and still maintain a yield advantage. Family B genetics respond favorably to environments that lowers inter-row competition and allow ears to flex. Populations pushed higher than 34,000 in 30" rows stresses corn plants enough to minimize positive-yield responses, while a narrow row system allows more room to flex. Therefore, populations can be increased by as much as 4,000 plants per acre over 30" row recommendations to increase yield potential. Family F genetics are ear-count dependent and respond favorably to higher plant populations regardless of row spacing. Maximum yield potential is often achieved with these genetics with 36,000+ plants per acre due to limited ear-flex capabilities. A positive-yield response witnessed in narrow rows may be attributed to better agronomic characteristics that aid in increased yield potential. The intensive row spacing and population study continues to demonstrate AgriGold's commitment to promoting value in genetic diversity and maximizing every acre with proper management.

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IMPORTANT IRM INFORMATION: RIB CompleteT corn does not require the planting of a structured refuge except in cotton growing regions where corn earworm is a significant pest. See the IRM/Grower Guide for additional information. Always read and follow IRM requirements.

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Roundup Ready® crops contain genes that confer tolerance to glyphosate, the active ingredient in Roundup® brand agricultural herbicides. Roundup® brand agricultural herbicides will kill crops that are not tolerant to glyphosate. Acceleron and Design®, Genuity and Design®, Genuity Icons, Genuity®, Processor Preferred and Design®, RIB CompleteT, Roundup PowerMAX®, Roundup Ready 2 Technology and Design®, Roundup Ready®, Roundup®, VT Double PROT, VT Triple PROT, and YieldGard VT Triple® are trademarks of Monsanto Technology LLC. Ignite® and LibertyLink® and the Water Droplet Design® are registered trademarks of Bayer. Herculex® is a registered trademark of Dow AgroSciences LLC. Respect the Refuge and Corn Design® and Respect the Refuge® are registered trademarks of National Corn Growers Association. All other trademarks are the property of their respective owners. ©2011 Monsanto Company.

Roundup Ready 2 TECHNOLOGY®

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CLEANER FIELDS, HIGHER YIELDS®

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LIBERTY LINK® IGNITE® HERBICIDE TOLERANT

Insect Resistance Management

Before opening a bag of seed, be sure to read, understand and accept the stewardship requirements, **including applicable refuge requirements for insect resistance management,** for the biotechnology traits expressed in the seed as set forth in the Monsanto Technology/Stewardship Agreement that you sign. By opening and using a bag of seed, you are reaffirming your obligation to comply with the most recent stewardship requirements.

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