AGRONOMIC Spotlight

Technology Development & Agronomy by MONSANTO

Optimizing Planter Performance for Various Soybean Seed Sizes

Regardless of soybean seed size, adjusting planting equipment to correctly and successfully plant the seeds is a necessary step. Equipment manufacturer manuals provide guidelines that should be reviewed prior to planting to help address the successful planting of various seed sizes. In general and dependent on seed product, soybean seed for 2013 is larger in size; therefore, planting equipment should be adjusted and set appropriately.

The Basics

Equipment condition is a starting point for proper seed placement and stand establishment (Figure 1). If not new, planting equipment should be washed to remove residual dust and debris. This can allow for easier inspection of parts for wear and proper operation. Sprockets, bushings and bearings, belts and chains, planting units, brushes, springs, wear plates, furrow openers, hydraulics, electronics, welds, etc. should be examined for wear, cracks, and settings. Worn parts should be replaced, lost bolts replaced, broken welds repaired.

Talc and Graphite

Talc or graphite may allow seed to be more consistently released from seed disks and other planting mechanisms. Refer to the operation manuals for recommendations regarding the use of talc or graphite.

Calibration

Regardless of planter type, calibration steps should be accomplished prior to full-scale planting. Initially, run the unit across approximate field conditions to observe for planting accuracy. Once in the field, stop after reaching planting speed for a distance and check seed drop, spacing, and depth.

Grain Drills

Grain drills are traditionally used when narrow soybean rows (7 to 10 inches) are desired. However, a uniform planting depth of 3/4 to 1 1/4 inches can be a problem with drills unless depth control wheels or bands are on the drill. When planting into firm soil, seeding depth can be too shallow; alternatively, depth can be too deep in loose soil. Caution should be exercised in drills equipped with fluted metering devices as large soybean seed can be cracked, and seed may not be spaced uniformly in the row. Vacuum or seed-singulating devices have the ability to plant more uniformly.

Grain drill management practices, adjustments, and settings should include:

- Drill should be leveled with the tractor.
- Wheel tracks should be removed ahead of the drill in tilled soil.
- To help promote uniform planting depth, utilize a leveling tool between the tractor and drill.
- Double-disk openers should utilize depth bands or depth gauge wheels.
- Press wheel down-pressure should be adjusted to help maintain good seed-to-soil contact.
- Planting speed should be monitored as higher speeds can increase planting depth.
- Seed metering devices should be adjusted to plant desired seeds per foot of row. Smaller seed is normally planted more uniformly with fluted metering devices.

Vacuum Metering Units

Pneumatic metering type planters can plant most seed sizes when the appropriate disk size and air pressure settings are utilized. Refer to manufacturer manuals for the proper air pressure setting for the seed size. The air system should be checked for any air or vacuum leaks that can compromise planting rates.

Figure 1. Planting desired population starts with properly maintained and adjusted equipment.

To select the proper seed disk, seed should be placed into the disk cells and observed for fit. A larger disk should be selected if one seed can not fit properly into a cell and a smaller disk selected if two seeds can fit in a cell. If sizing determines that two disks are nearly equal in fit, the smaller hole disk should be selected as it should be easier to increase vacuum to compensate for skips rather than decrease the vacuum to guard against doubles.

[The top planting speed may have to be reduced if a seed disk with fewer cells is selected to plant larger seed so the capabilities of the seed meter being used is not exceeded. A disk with fewer cells must rotate at more RPM to maintain a given population relative to a disk

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with more cells. As an example, if 140,000 seeds per acre is the desired planting rate in a 30 inch row spacing and seeds are to be placed 1.49 inches apart, a 100 cell disk should be operate at 40.30 RPM at a planting speed of 5.7 MPH. If a 130 cell disk is used for the same population and spacing, the RPM and MPH are 40.25 and 7.4 respectively. The operational range is from 12 to 60 RPM and the ideal range would be 20 to 40 RPM.][9]

The Kinze® EdgeVac® Seed Metering System has two recommended discs for soybean: 1) Black 60 cell for seeds per pound of 2,200 to 4,000 and 2) Dark Blue 120 cell for high rate seeding of 2,200 to 4,000 seeds/lb.[2] Edible bean seed tends to be larger in comparison to soybean seed. The discs used to plant edible bean seed could potentially be used for very large soybean seed (Dark Green 54 cell disc is recommended for 1,200 to 2,500 seeds/lb of edible bean seed).[2]

Daily planter maintenance should include disk and brush cleaning. They should also be checked for any damage.

Feed Cup or Radial Meter Type Planters

Planters equipped with feed cup mechanisms require attention to sprocket and speed settings. The manufacturer's manual should be referenced for initial sprocket settings for soybean seed size. Seeds coated with seed treatment could change how the seed is metered through the cups; therefore, field checks are necessary to determine actual planting rate. Planting speed should be adjusted accordingly to maintain the rpm of the feed cup if sprocket size is changed. A slower moving feed cup could pick up more seed as it revolves, which would not reduce the planting rate. Planting speed should not be greater than the defined maximum speed for the sprocket in the manufacturer manual.

John Deere® indicates that switching to radial bean meters instead of the feed cups allows for seed to be singulated. As with feed cups, actual planting rates should be checked after planting a distance at field speed. At higher planting speeds, large soybean seed may plant at lower rates. Small seed can increase in seeding

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Table 1.
Equipment Adjustments to Plant Smaller Soybean Seed[7,8]

	Seeds per Pound					
Planter Type	3500	3700	4000	4100	4500	5000
John Deere® Vacuum	Use 64 cell cotton disc and vacuum levels of + 5-7 inches. Sprocket setting should be reviewed and planting speed may need to be reduced					
Case IH, New Holland ASM Vacuum	Use regular soybean disc		Use small soybean disc			
Kinze® Brush-Type Seed Meter	Use black 60 cell soybean disc					
John Deere Radial Bean Meter	Use "B" setting		Use "A" setting			
John Deere Feed-Cup	Use soybean cup and standard soybean seed guide			Use soybean cup and # 48005 seed guide		
John Deere 750 Grain Drill	Set Seed Index Notches to manual specifications for the rate in pounds/acre.					

Table 2.
Equipment Adjustments to Plant Larger Soybean Seed

Planter Type	Large Seeded Soybean Recommendations
John Deere® Vacuum	Use disk # A42586 (108 cell) for 1,700 to 3,500 seeds/lb and vacuum level of 8 inches.[5]
Case IH Early Riser® ASM Seed Meter System	Seed disk B7698875 (10045-SB) or 377669A1 (8045-SB) and vacuum setting of 15-17 inches, baffle setting of 2, and singulator dial setting of 8 for 2,000 to 3,500 seeds/lb[4]
Kinze® Brush-Type Seed Meter	Use Dark Blue 48 cell soybean disc for 1,400 to 2,200 seeds/lb[3]
Kinze® EdgeVac® Seed Metering System	Black 60 cell for 2,200 to 4,000 seeds/lb; Dark Blue 120 cell for high rate seeding of 2,200 to 4,000 seeds/lb[2]
John Deere Radial Bean Meter	Use "C" setting for 2,000 to 2,800 seeds/lb[6]
John Deere Feed-Cup	Use soybean cup and standard soybean seed guide
John Deere 750 Grain Drill	Set Seed Index Notches to manual specifications for the rate in pounds/acre.

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rates if planting speed is reduced. Planting faster than the maximum manufacturer manual chart speed could result in less than desired results. To adjust for different seed sizes, the indicator should be moved to (A) for small seeds (~ 3,700 to 4,500 seeds/lb), (B) for medium small (~ 2,800 to 3,700 seeds/lb), and (C) large (~ 2,000 to 2,800 seeds/lb).[1]

Though there are less moving parts with radial meters and life expectancy of the parts should be longer, daily maintenance should include inspection of the brush, seed bowl, and knockout assembly.

For Kinze® planters with Brush-Type Seed Meters, the black 60 cell soybean disc is generally used for smaller seed as indicated in Table 1.[3] The dark blue 48 cell brush meter seed plate is recommended for larger seed (1,400 to 2,200 seeds per pound).[3]

Summary

Seed selection should be based on agronomic characteristics (disease tolerance, standability, maturity, soils, etc.) rather than seed size. However, year-to-year and individual area production environments and can influence seed size within the same seed product. Therefore, proper adjustments and maintenance should be addressed to plant the desired seeds/acre to help maximize potential yield.

Sources

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ASM Seed Meter System