ABCs OF GROWING SOYBEANS

NorthStar Genetics

The ABCs of Growing Soybeans

Although soybean growers have found the crop relatively easy to grow and manage, here are some tips for ensuring successful soybean production.

VARIETY SELECTION

The first consideration prior to growing a soybean crop is the variety or varieties to be grown. By far the most important factor to consider is maturity. With temperature the main limiting factor to soybean production in Western Canada, it is crucial to know your maturity zone as a starting point. Soybean varieties also have varying degrees of day length sensitivity, so variety information from local sites should be given special attention, as those varieties with high daylight sensitivity will reach maturity without the ideal heat units, and thus can be grown very successfully in non-traditional areas.

Relative maturity ratings for varieties recommended for the prairies range from 000.6 to 00.9 (2225 to 2600 heat units) and are generally divided into early, mid, and long season classes, with days to full maturity typically ranging from 105 to 130 days. Select a variety whose rating fits your geography for the best chance of success and profitability. We recommend that if you are growing a large acreage, using more than one variety within a maturity class suitable for your area should be used, in order to balance risk of early frost with higher yield potential of later varieties.

Other variety considerations such as disease resistance and growth habit (i.e.: height, branching) will depend on your field conditions and agronomic practices, which will be covered later.

FIELD SELECTION AND SEEDBED PREPARATION

Soybeans are adapted to and can grow very well in a wide range of soil types, but most ideally in medium-textured loamy soils. Not recommended are lighter sandy or gravelly soils prone to drought, due to the crop's requirement for late season moisture, and very stony fields due to harvest issues. Heavy clay soils require careful preparation to get the crop well established, but otherwise this soil type and soybeans are well-suited to each other as soybeans can tolerate the waterlogged conditions these soils are susceptible to.

A critical factor for successful soybean establishment is for them to be planted into warm soil of at least 10°C, and to be able to get to that soil temperature as soon as possible in order to plant early enough to take advantage of as many heat units as possible. To achieve this, it is recommended that the field is blackened to some extent to maximize solar heat absorption. It is suggested that this be done in the fall via a single tillage or heavy harrow operation that will expose the soil while maintaining some stubble, to guard against cool, wet spring conditions that may impede getting this done in a timely manner. This is particularly important on heavy clay soils which tend to take longer to warm up and dry in the spring.

SEEDING

A) Seeding Date

If there is one single thing to take away from reading this document, it is to not plant soybeans into cold soils. Research has shown that soil temperatures of less than 10°C in the first 24 hours after planting will give the seeds a “cold shock” from which they will never fully recover. In addition to lower germination and higher disease susceptibility, the surviving plants will have shortened internodes, which leads directly to shorter plants with lower pod heights.

Although soybean cotyledons can withstand a light spring frost of up to -3°C for short periods, it is advised that seeding should be delayed to avoid the risk of frost injury. One rule of thumb suggests waiting until about 5 days before the typical last frost date before planting, provided the soil is adequately warmed up.

B) Seeding Rate and Row Spacing

Recommended soybean seed rate targets are for 200,000-220,000 plants/acre solid-seeded, 175,000-200,000 in a narrow row (15-22 inches), and 150,000-175,000 in wide row (30 inch) spacing. With the enhanced vigor of the new RR2 and RR2X generation varieties, most growers are trending towards the lower ends of those ranges.

There is no one best row spacing to use, as it can be dependent on your geography, heat units, machinery available, pest management, and other cultural practices. Variety selection is also important to consider, as varieties which have lower tendency to branch (typically the earlier ones) are better suited to solid seeding as opposed to more bushy types that will provide better ground cover in a wider row spacing.

Solid seeding is the most popular option, as for most growers it can be done without having to purchase extra equipment. Weed control is usually better because the beans are quicker to cover the ground. It can

also speed up maturity as the plants are less inclined to branch out, and in some cases late season frost tolerance is improved because there is better heat retention within the canopy if there is full closure. The main disadvantage of solid seeding is the higher seed costs, due to the higher plant populations required. There could potentially also be increased risk of white mould (sclerotinia) development due to reduced air movement in the canopy.

Conversely, wide row spacing can reduce seed costs and disease incidence. Disadvantages include less weed competition, making season long weed control more difficult and, more importantly, possibly lengthen the days to maturity. For these reasons, it is recommended that varieties with good branching ability be used, and in areas where the length of the growing season is less of a limiting factor.

Narrow row spacing is considered by many as being the happy medium of solid seeding and wide spacing, with both the advantages and disadvantages of each mitigated. Semi bush varieties with good branching ability should also be considered at this spacing.

C) Seeding Depth

Ideal seeding depth is ¾" to 1 ½" – enough to ensure good moisture contact while shallow enough to ensure seed is in warm ground. Soybean seedlings are adversely affected by any deeper seeding, resulting in higher mortality and lower pod set. Rolling the field afterwards is recommended to push in stones and level the field to facilitate harvest. This practice makes the harvest go much more smoothly as it allows the operator to cut lower to the ground to get all the pods without risk of damaging the combine. Keep in mind however that this operation will likely add an extra half inch to your seeding depth.

D) Seed Treatment

Soybeans are susceptible to soil-borne diseases such as root rot and should be treated with a fungicide before seeding. Although most new varieties come with some tolerance to Phytophthora root rot, seed treatments are a vital part of integrated management to prevent the development of resistance. A fungicide product combined with an insecticide for early season control of insect pests such as wireworms is recommended.

E) Inoculant and Fertility Requirements

Next to soil temperature, inoculation is the next most important factor for bean production. Soybeans are heavy consumers of nitrogen – about 6 pounds actual for every bushel of production. As a result, it is imperative that inoculant levels are high enough to ensure proper nodulation in order to take advantage of the soybean crop`s nitrogen fixing ability. Seed

applied inoculants (peat or liquid) encourage nodulation on the primary roots, starting the N-fixing process early in plant growth, while granular inoculants tend to populate the lateral roots.

It is highly recommended that both forms of inoculant are used on fields in the first few years of soybean production. Although it is possible for rhizobia populations to build up in the soil over time, several research studies have shown that these populations often have difficulty surviving through our cold winters and anaerobic conditions under excessive moisture. For these reasons, most growers tend to continue using the dual application as a cheap form of insurance.

A soybean crop requires about 30-40 pounds of phosphorous per acre. Where soils are deficient, adding potassium and sulfur fertilizer can also be beneficial. Care must be made when applying fertilizer products, as the seed and rhizobia are sensitive to the associated salts. Banding to the side and below the seed row is recommended.

In many cases, seeders only have one additional tank for a secondary product, and it is usually used for the granular inoculant. Under no circumstances should one try to blend a fertilizer with the inoculant as, in addition to the toxicity to the rhizobia, there would be uneven distribution of both products due to settling in the container.

Many growers manage their rotations so that there are sufficient residual nutrients, so no fertilizer is required the year soybeans are grown.

PEST MANAGEMENT

A) Weeds

Soybean seedlings are not very competitive with weeds, as they are slow to provide complete ground cover. Fortunately, most weeds can be managed effectively and inexpensively with glyphosate tolerant varieties, with enhanced control options with the new glyphosate/dicamba traited soybeans. The glyphosate offers a wide window of application – from the first trifoliate to flowering. In this system, the main weed issue is other glyphosate tolerant crops, and canola in particular. Volunteer RR canola can be controlled if sprayed early enough with an applicable Group 2 product. As this would add a considerable amount to your herbicide expense, it is advised that the potential for this problem be considered with your rotation.

B) Diseases

Aside from soil-borne diseases previously mentioned, soybeans in Western Canada have very little disease issues, particularly outside the Red River Valley of Manitoba. Beans are susceptible to white mould (sclerotinia), though not to the extent that canola is, and with no good

control option the best way to manage it is by avoiding other sclerotinia susceptible crops in the rotation, or with wider row spacing to facilitate air movement under the canopy. Powdery mildew could be a potential issue, but would only require control if plants are affected in the first half of the growing season. Other leaf diseases such as brown spot, frogeye leaf spot, and bacterial blight, are often seen but only very rarely come close to economic thresholds.

C) Insects

Recent research from NDSU has determined that the level of defoliation required to meet economic thresholds to be 40- 50% pre-bloom, 35% during bloom, and 20-25% post-bloom. A number of insects, including grasshoppers, corn earworm, fall armyworm, and green clover worms, have been identified as potential pests of soybeans. Given the soybean plant's high tolerance for defoliation, control of those pests is seldom required. Fields in southern Manitoba could be susceptible to soybean aphids which blow up from the U.S. Tolerance levels for these aphids are high, with a population of 250 and rising per plant, so again control is not usually required.

As with most other crops, soybean seedlings are susceptible to cutworms, so it is important to watch for any patches of missing or damaged plants developing at the beginning of the season. As cutworms feed at night, you will need to dig within 2-3 inches from recently damaged plants to find them and confirm the problem.

HARVEST AND STORAGE

Harvest of soybeans can begin once pods have dried out and seeds are hard. Due to their resistance to shattering and seed deterioration even under severe fall weather, standing soybeans provide a very high flexibility for harvest scheduling. They can be harvested at 20% moisture, but must be stored at less than 14% moisture to avoid spoilage. The potential for seed damage while combining becomes greater with lower moisture, and it is not advised to harvest them at less than 12% moisture.

In general, soybeans have to be cut low to the ground to minimize harvest losses, so harvest equipment equipped with a flex header is highly recommended.

It is important to adjust combine concaves and cylinder speed carefully in order to maximize seed recovery while minimizing cracking and splitting. Note that 4 seeds per square foot on the ground equates to 1 bushel lost per acre.

NOTES

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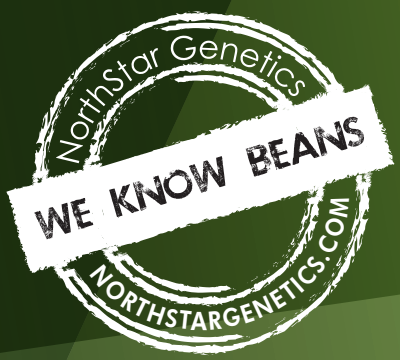

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