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Producing Early-Maturity (Group IV) Soybeans On The Texas Gulf Coast

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Over the past two decades, soybeans have commanded more than twice the price of corn per bushel. Like corn, soybeans require rain in June and July for best performance. Interest in soybean production in South Texas began in Calhoun County in the mid-1970s and spread to other counties along the Upper Texas Gulf Coast. Acreage in 1994 (all of Texas) reached 220,000, with nearly all beans being marketed through local elevators or by truck to the Port of Houston.

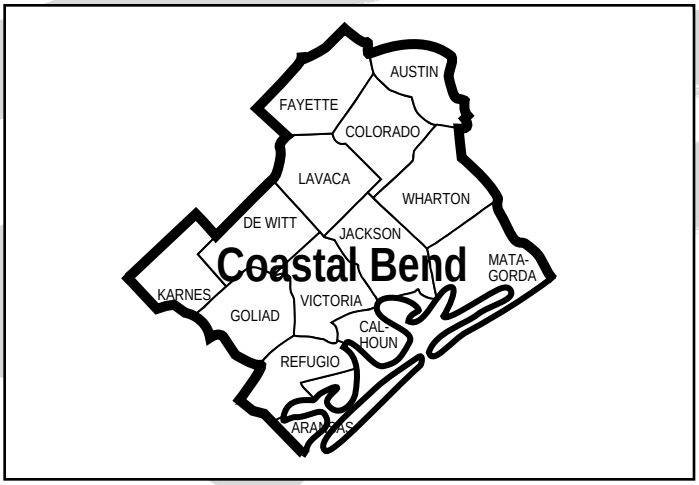

Figure 1. Texas Gulf Coast counties predominantly growing maturity group IV soybean varieties.

Uses of Soybeans

Soybeans are used extensively in the manufacture of cooking oils, paints, feed supplies, plastics, and some food products. The highest Texas soybean acreage was grown in 1982, with 1 million acres planted, of which 920,000 acres were harvested. In Texas, soybean acreage is usually highest when some type of cropping disaster occurs and it is too late to plant conventional crops. In 1989 and 1992, acreage surged to 500 and 400 thousand acres, almost doubling the normal soybean acreage. If the beans produced are of sufficient quality, they are usually directed to the export market.

Reasons for Soybean Production

Low grain prices have encouraged Texas growers to seek alternative crops to increase profitability. Soybeans have offered the opportunity to rotate away from corn and sorghum without the need for much additional equipment and higher management, such as is required to produce cotton.

Soybeans allow the grower the flexibility to control troublesome row crop weeds with different families of herbicides, and the costs for fertility inputs are low. Both of these characteristics make soybeans a desirable crop. In addition, soybeans do not produce aflatoxin and, to date, have commanded good prices in oil, feed, and export markets.

Soybean acreage has increased in Victoria, Calhoun, Jackson, and Matagorda counties because of the crop's low input costs.

Selection: Adaption and Maturity

Primarily Group IV and very early Group V soybeans are grown on the Texas Gulf Coast. These are planted in late March and as late as April 20. Many of the best Group IV's grown in the Midwest fail to produce sufficient plant size in South Texas. After an evaluation and culling process, acceptable soybean varieties are selected for higher yields, podding height, tolerance to iron chlorosis, ability to achieve sufficient plant height, and low shattering.

The greatest limiting factor for yield is the lack of an even and sufficient supply of rainfall to enable full pod set and seed development. Occasionally soybeans reach sufficient plant size and fruit set, only to run out of available soil moisture, and the yields are low because of small seed size.

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Fewer than a dozen varieties are widely grown. Some of the most consistent-yielding varieties on the Texas Gulf Coast have been Northrup King RA 452, DPL 415, DK 469, Pioneer 9501, Crawford, and JMS 4982. Because of the distribution and timing of rainfall, early-maturing soybeans are grown only in extremely wet years south of Refugio County.

North and east of Houston, the conflict with the rice planting season and the higher rainfall in August precludes the use of Group IV soybeans. Group VII's and VIII's are used because they may be planted in May and harvested in October and November, when rainfall is generally at a minimum. When Group IV's were used, less than 1 year in 4 produced soybeans that were not damaged (molded, discolored) because of wet weather at harvest (August-September).

Soybeans have been grown successfully as far west as Caldwell and Wilson Counties. Rainfall in May and June is essential for acceptable yields. Soybean yields from 25 to 35 bushels are common on deep dryland soils with average rainfall. Growers in areas with a wet growing season and higher rainfall may see yields as high as 55 bushels. Only a few times have yields exceeded 60 to 65 bushels per acre on the Texas Gulf Coast. Although soybeans bloom over a wider period of time than corn, the in-season water requirements are nearly the same. Yields of soybeans will depend on the amount and distribution of water.

Planting, Fertility, and Growth

Soil and Seedbed Preparation

Soybeans should be planted to establish a row population of 10 to12 plants per foot of row. Depending on seed size, this could be 50 to 60 pounds per acre (1 bushel per acre). Soybeans are self-pollinating and, like cotton, have not been hybridized. A planter that provides uniform distribution and a consistent 1 1/2-inch seeding depth is required. Seed should be planted to good moisture. Soils should be well drained, fertile, and fine enough to permit good herbicide incorporation. Seed should be inoculated with alkaline strains of bacteria just before planting. Many producers apply a double rate of inoculum if the seed is being planted to soils where soybeans have not been previously grown.

Narrow row spacings (20 to 30 inches) will produce optimum yields if sufficient water is available. Both 30- and 38-inch rows are widely used in Texas. Soybeans are seldom double-cropped because of the risk of depleting moisture needed by the subsequent crop.

Fertility Requirements

Soybeans meet their own nitrogen requirements by "fixing" nitrogen from the air. This occurs in nodules produced on the roots of soybean plants. Nitrogen fixation begins about 2 to 3 weeks after emergence. Until this capability is established, seedings survive on carbohydrates stored in the seed and soil nitrogen. When cut with a knife, productive nodules are pink, while non-fixing nodules will appear greenish to gray or white on cutting. Nitrogen-fixing bacteria are "lazy" in that they will use available soil nitrogen before fixing their own from the soil atmosphere.

Soybeans will respond to phosphorus and require higher levels of potassium for seed production. Many South Texas soils have sufficient potassium, so potassium fertilization may not be necessary. Soil pH should be 6.0 to 7.8 for best production. Starter fertilizer has been used on low-fertility soils to encourage early growth.

Blooming and Podding

Soybeans usually have white or purple self-pollinating flowers. There is almost no aroma to the flower, and bees and insect pollinators seldom visit these plants. Pods are borne on racemes (clusters) with 1 to 5 ovules (compartments) per pod. By far, the majority of pods have 2 or 3 ovules. Dry weather will cause seed to abort, and some ovules will remain flat.

Determinant plants cease most vegetative growth after blooming is initiated, have more lateral branches, and bloom over a shorter period of time. Indeterminant plants continue to grow while flowering, have fewer lateral branches, and generally have a longer season in maturity. Many soybean varieties are composites of both kinds of features.

Pods that form too low to the ground cannot be harvested without placing the combine's cutterbar directly on the soil surface. Varieties are often selected that fruit 3 inches or more above the soil surface to facilitate a cleaner, more efficient harvest.

Pest Management

Weed Control

A successful weed control program in soybeans involves a combination of good cultural, mechanical, and chemical practices. Examples of good cultural and mechanical practices include:

- Using weed-free seed.
- Rotating crops.

- Preparing a good and weed-free seed bed.
- Cultivating in a timely manner.
- Making and using weed maps of fields to aid in proper herbicide selection.

A large number of herbicides is registered for chemical weed control in soybeans. These include preplant-incorporated, preplant surface-blend, preemergence, and postemergence herbicides. In general, some provide better control of grasses, while others provide better control of broadleaf weeds.Your choice of a herbicide depends on the weeds present, environmental conditions, soil type, rainfall patterns, and planting method.

Growers are encouraged to use a combination of acceptable soil-applied grass and broadleaf weed herbicides to obtain early-season and residual control of weeds. The weeds present will determine which herbicides you should use. There may be situations where only one herbicide may be needed, depending on whether grasses or broadleaf weeds are present. When soybeans are planted in conventional row spacing, banding herbicides is recommended to reduce costs. Weeds between rows can be controlled with timely cultivations.

Selection of postemergence herbicides, as with soil-applied herbicides, depends on the species of weeds present in the field. The timing of the application is important to ensure good weed control. If weeds get too large, they are often more difficult to control. The costs of using selective postemergence herbicides can also be reduced by banding or semi-directing the herbicide into the row when soybeans are planted in rows wider than 20 inches. Again, cultivation can remove weeds between rows.

Weed-wiping or rope-wicking with glyphosate is useful in eliminating large weeds that stand 6 inches or more above the soybean canopy. Johnsongrass may be prevented from heading with timely rope-wicking.

Suppressing Vining Weeds

Vines such as morningglory and bindweed present special harvest problems when they are not controlled. If morningglories grow up into the soybean canopy in sufficient numbers, they will interfere with harvest and will wrap the combine reel and clog the augers as vines enter the combine. If you don't apply a dessicant to these vines, you can expect many work stoppages during harvest. Early-season treatment with materials such as Blazer and Cobra may kill small vines and permit sufficient shading to keep established vines below the canopy. A hooded sprayer or post-directed herbicide applied to the base of the soybean plants can also burn back the vining plants. Light flame cultivation has been used successfully in some growing regions to remove small in-row weeds, but must be carefully applied because soybeans have no protective bark. Fields with heavy vine problems should be cleaned-up before they are returned to soybean production. Shading by vines can reduce soybean yields as much as 50 percent.

Glyphosate-Resistant Soybeans

Also called "Roundup-Ready" soybeans, these genetically engineered varieties permit over-spray of the soybean plants or canopy with glyphosate, killing all weeds present while leaving the soybean plant unaffected. This enables blanket removal of all grasses and broadleaf weeds, providing the weeds are not under stress (not growing actively) at the time of application.

Insect Pests

The primary soybean insect pest in Texas is the stinkbug. These insects attack pods and seed and will cause ovules to abort, damaging the seed and reducing seed numbers. Treatment is justified when one stinkbug is found per row-foot or 36 or more 1/4-inch stinkbugs are found per 100 sweeps. Leaf and pod feeders usually come too late in the season to be of economic concern. Soybeans can lose up to 50 percent of their leaf area (depending on the growth stage) without yield reductions. Early-season to mid-season pests occasionally include cutworms, beet army worms, and 3-corner alfalfa hoppers (for more information, see the Texas Agricultural Experiment Station publication B-1501, "Managing Soybean Insects").

Diseases

The most common soybean diseases encountered on the Texas Gulf Coast have been various types of root rots. Southern blight has been observed in some no-till fields. There is usually not enough cool, wet weather to cause seedling diseases, but some foliar diseases have been observed during wet growing seasons with higher humidity.

Harvest

Harvest Preparation

The presence of stinkbugs will frequently delay maturity of some plants or portions of fields because of the destruction of pods. These plants will remain

green and will increase seed moisture or delay harvest of the entire field. Late-season broadleaf weeds may also interfere with harvest and increase moisture levels. Under these conditions some type of salvage desiccant or defoliation material may be required. Sodium chlorate has been used to desiccate weeds and rank growth as a harvest aid.

Determining Time of Harvest

As soybean plants begin to mature in late July and early August, the leaves turn yellow and brown. The plants are largely self-defoliating. Showers at harvest increase the risk of pod shattering and field losses. Periods of wetting and drying may cause the pods of some varieties to split open and eject part or all of the seed onto the ground. Soybeans should be harvested as soon as the seed reaches 13 percent moisture. At this point, the pods are brittle, and rubbing them between the palms of your hands will readily shell-out the soybeans. The stems naturally dry down as the leaves are shed. If rank growth occurs and stems remain green, the long, flexible stems could interfere with harvest.

Minimizing Field Losses

Soybeans that are harvested with few splits and low weed seed contamination will command the highest prices. You can achieve a clean harvest and reduce field losses by following these recommendations:

1. Keep the combine in good repair.
2. Run the reel (tip speed) 10 to 20 percent faster than the ground speed. Excessive reel speeds tend to thresh pods at the reel instead of at the cylinder. This shatter-loss is worse with drier beans (less than 12 percent moisture).
3. Set the reel axle 8 to12 inches ahead of the sickle on a standard header. With a pickup reel and floating cutterbar, the reel axle should be about 4 inches ahead of the cutterbar.
4. Operate the bat reel just low enough to tip the stalks into the platform. The tips of the fingers on a picking reel should clear the cutterbar by about 2 inches.
5. Keep forward speeds below 3 miles per hour.
6. Cut the stalks as low as possible. Use an automatic header control, a flexible cutterbar, or both.
7. Check the combine speed. A small deviation from the correct engine speed makes cleaning and separating difficult.
8. Set the air blast to remove chaff and straw, but not to blow beans into the tailings or out of the rear of the combine.
9. Set the cylinder speed and cylinder-concave clearance according to the operator's manual for operating conditions. For most combines, if the recommended cylinder-concave clearance of soybeans is $^{3}/_{16}$ to $^{5}/_{16}$ inch at the back and $^{3}/_{8}$ to $^{1}/_{2}$ inch at the front. The cylinder speed must be adjusted for the threshing conditions. It is important to run cylinders as slowly as possible to achieve complete threshing. When the beans are above 13 percent moisture, they are usually tough and you may have to increase the cylinder speed to 700 to 750 rpm. As the beans dry, reduce the cylinder speed to 450 to 500 rpm. For newer John Deere combines and Case rotary machines, reduce these rpm figures by 25 percent.
10. Losing just 4 to 5 beans per square foot (across the full width of cut) means a total loss of 1 bushel per acre. Keep in mind that there could be 20 beans per square foot just behind the separator, but the average count across the full span of the machine may be much less. Check for losses and make adjustments as needed. Under normal operating conditions, losses should not exceed 1 $^{1}/_{4}$ bushels per acre. Don't forget to include any unthreshed seed in pods clinging to the stubble.

Seed Quality

Because of concerns over high temperatures and seed size, little planting seed has been produced in South Texas. The primary contaminants of soybeans are morningglory seeds, cocklebur, and other large-seeded species.

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