Replant Decisions – Corn

Sometimes corn fields fail to emerge at the plant population expected when the field was planted. This can happen for many different reasons (See Rob-See-Co Agronomy Tips *Common Emergence Problems – Corn*, April 2015), but regardless of the reason, the new questions become: "How much yield can I expect from this plant population," and "Would I be better off if I replanted this field?"

Corn responds favorably to both higher plant populations AND early planting. Conversely, lower yields will likely result from either a lower than optimal plant population OR a later than optimal planting date. Replant decisions must be based on a comparison of the yield potential of the lower than desired plant population at the initial planting date to the yield potential of a full plant population at the new, later planting date. The potential yield gain must be great enough to fully off-set the lost yield from the lower plant population and the cost of the replant operation, plus return a reasonable profit opportunity.

The yield response of corn to higher plant populations is not a linear (one to one) relationship. Basically, the first 10,000 plants/acre contribute more yield than the next 10,000 plants, and significantly more yield compared to the last 10,000 plants. Table 1 shows the contribution of percent emerged population to percent of optimal yield potential. Half of a stand, or 50% of the optimal plant population, will generally produce two-thirds (approximately 65%) of a crop. This table assumes a planting date of mid-May or earlier, a relatively even distribution of plants, and normal competition from weeds. Seventy percent (70%) of optimal population will not produce 85% of a full yield if the population is comprised of large gaps that are full of weeds and a plant spacing that is normal everywhere else. (Large gaps are defined as three feet or row and greater with no plants.)

Table 1. Contribution of Percent Emerged Population to Percent Yield Potential

Percent of Optimal Emerged Population	Percent of Optimal Yield Potential
30	40
50	65
70	85
90	95
100	100

The second half of the replant decision process is to determine the yield potential of the replanted crop. Table 2 shows yield potential, expressed as a percent of optimum, by planting date. Corn planted in late May will yield 80% of optimum, for example, and corn planted in early June will only yield 60% of optimum.

Table 2. Percent of Optimal Yield Potential by Planting Date for Corn

Planting Date	Percent of Optimal Yield Potential
Late April	100
May 10	98
May 20	90
May 30	80
June 10	60
June 20	40

The final part of the replant decision process is to determine how much it will cost to actually replant the field. Replant costs will vary by operation, based on size of equipment and labor costs, and include the cost of replacement inputs, like seed, the cost to kill the existing stand, and the cost to do the re-plant operation. As an example, if the cost to replant is $90/acre and the expected grain price is $3.00/Bu grain price, the replant must yield at least 30 Bu/acre more than the original planting in order to break even (30 Bu/acre times $3.00/Bu = $90/acre).

Using the information in Tables 1 and 2 to figure real life examples:

- If the field has a yield history of 200 Bu/acre and emerged at 70% of optimal population, the expected yield potential would be 85% of 200 bushels, or 170 Bu/acre. A full stand replanted on May 30th would be expected to yield 80% of 200 bushels, or 160 Bu/Acre. Best decision: keep the lower than desired stand.
- If the field has a yield history of 220 Bu/acre and emerged at 50% of optimal population, the expected yield potential would be 65% of 220 Bu, or 143 Bu/acre. A full stand replanted on May 20th would be expected to yield 90% of 220 bushels, or 198 Bu/acre. At a replant cost of $90/acre and a grain price of $3.00/Bu, the additional 55 Bu/acre (198 minus 143) represents $165/acre and exceeds replant costs by $75/acre. Best decision: replant the field as soon as possible.

Other considerations when replanting corn:

- Plant 2,000 to 4,000 fewer seeds per acre. This lower population will help the crop mature more quickly and, from an input cost standpoint, betters match the new, now lower, yield potential.
- If the replant occurs by the end of May, plant a hybrid that is 5 to 7 Relative Maturity (RM) units earlier than what is considered full season for the area. If the replant occurs in June, plant a hybrid that is 8 to 12 RM units earlier than full season.
- Eliminate all plants from the initial planting. This is to prevent competition between the replanted crop and the few remaining plants from the initial planting. Early planted survivors will be significantly larger and will dramatically reduce yield of replanted plants growing in the area surrounding them. The remaining early plants will also be much farther along at the end of the season and could cause harvest problems. Studies have shown that a field with 50% of the plants planted 20 days later will yield less than if the entire field was planted 20 days later.