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Suncrest AgriBusiness Company: optimizing seed production

Philip C. Jones, Timothy J. Lowe, and Saurabh Bansal wrote this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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As Flavio Snodley walked to lunch one afternoon in September 2014, he pondered his recent meeting with William Buckhead, the senior vice-president to whom Snodley reported at Suncrest Agribusiness Company (Suncrest). Suncrest was a Fortune 500 chemicals conglomerate, and owned one of the five largest agribusinesses in the world. The company’s agribusiness division was headquartered in the Midwestern United States, where the demand for agribusiness products (agricultural seeds, pesticides, etc.) was highest.

Snodley had joined Suncrest’s Accounting department five years earlier, after getting his MBA and spending several years working in the fashion industry in New York City. Lured by the attraction of a slower-paced lifestyle in a more rural environment, Snodley had originally been quite enthusiastic about moving to Suncrest; however, he was beginning to wonder whether he had chosen wisely. Suncrest had initially offered a relaxed work environment, but things had been increasingly tense since the company’s new chief executive officer (CEO) took over in 2012. The CEO came from Suncrest’s traditional chemical business unit, where the market was largely stable, product offerings were mature, and cash flow was predictable. In contrast, in the agribusiness environment, product turnover was high, production processes were far from perfect, and matching supply with demand was a constant struggle.

In the last meeting of vice-presidents, the CEO had mentioned that he perceived a lack of “discipline” in the agribusiness unit. Accordingly, Buckhead had told Snodley that Snodley’s main objective at the upcoming annual production planning meeting should be to exert some discipline over the supply chain planning process. “Take a look at these numbers,” Buckhead said to Snodley as he pointed to a column of figures in a spreadsheet:

Last year we sold a little over 5 million bags[[1]](#footnote-1) of seed corn, but we ended the fiscal year with over 4 million bags of seed corn in our warehouse. . . . Where did we go wrong? Do we just have bad forecasts or do we not know how much to produce—or is it both? If we understand our cost drivers and prices, and supply and demand uncertainty, we should also be able to figure out how much seed to produce.

Snodley agreed with Buckhead that the amount of inventory seemed excessive, particularly in light of the new “lean manufacturing” initiative touted by Suncrest’s CEO. Wondering what the root cause of the excess inventory was, Snodley spent the next few days carefully interviewing a number of his colleagues from different areas of the company.

Food for Thought

While he ate lunch, Snodley thought about what he had learned since that meeting with Buckhead.

Snodley’s counterpart from Production, Linda Gregory, concurred that inventories were probably too high. She told Snodley that the problem was at least partially due to Suncrest’s unexpectedly high seed corn production in the past year. Although the company had anticipated producing only about 3.5 million bags of seed corn, favourable weather conditions led to a bumper crop of over 11 million bags.

Another employee, Ashish Phillips in Operations, said, “Part of the problem has got to be product line proliferation. Ten years ago, we had about 50 varieties in our seed corn line, and now we’ve got over 100. We’ve got some older hybrids that we still continue to produce, even though the demand is quite low.” Snodley thought that fixing this issue sounded fairly straightforward, but Phillips continued:

Another part of the problem is that when the corn grows, the kernels near the middle of the cob are flat, while those near the ends have a more rounded shape. While that may seem trivial, the problem is that some farmers have planting equipment that can only handle “flats,” while others have planting equipment that can only handle “rounds,” so we have to make sure we produce enough of both kinds to meet both demands. [Further,] . . . we’re starting to produce different seed coatings for the same varieties and market them separately. One coating, for example, is a fungicide that helps ensure the seed can germinate even if it is planted under cold, wet conditions. Other coatings in the pipeline will include different insecticidal coatings that will protect the growing corn plant from various insect pests. These new products [should] help the environment by reducing or eliminating the spraying of harmful chemicals, [and] save the farmer time and money, but the trouble is that we’d have to have seed coating equipment and chemical handling systems at each of our dealers to make this work. The dealers can’t possibly afford the capital investment that would require, and neither can we. Realistically, we have to have the coated seed, ready to sell, out to our dealers in time for the sales season.

Fred Barry, from Marketing, had yet a different take on the situation:

Sure, we have to carry some inventory, but look at our margins! We can certainly afford to carry a little inventory. The bigger problem is that we’re stocking out far too frequently. Sometimes we can steer the customer to a different variety, but sometimes we lose the sale entirely. Not only that, but sometimes we lose the customer permanently. Another problem is that the production folks do not want to produce some of the seed we need for our customers. We’ve got some loyal customers who have been using our seed for years, and they don’t want to change varieties. We just have to accept that we need to satisfy our customers and produce what they want. When customers come into a dealer, ready to buy, it’s because they want to get busy planting. If our dealer can’t supply the seed they want off the shelf, we likely lose the sale.

With these various opinions in mind, Snodley finished his lunch and prepared to accompany Suncrest’s top regional sales manager, Ellie Rodreguez, on a customer visit that afternoon. He was looking forward to hearing from some customers regarding these issues.

A difficult visit

Later that day, Snodley and Rodreguez pulled into Bob Fishkeg’s driveway. Rodreguez had to admit that she was not looking forward to this meeting. The motivation for the personal visit was that Fishkeg had called the Midwestern sales office the week before complaining about the “sub-standard” Suncrest corn seed he had purchased in April. Fishkeg farmed nearly 2,000 acres of prime land, but the dry summer had left his corn crop yield well below average.[[2]](#footnote-2) He had been a loyal Suncrest customer for many years, and Rodreguez did not want to lose his business.

Rodreguez grabbed several seed specification sheets from her briefcase and timidly approached the front door of the farmhouse. When Fishkeg appeared, he was visibly upset:

What the heck did you guys sell me? I purchased the variety you recommended and look at what happened. My yields are terrible! I harvested only half the corn this year compared to last year! I have half a mind to switch to some other brand of seed. How can I have confidence in your seed when a disaster like this hits me? My profit on corn is small even when yield is good, but when a disaster like this hits, I go in the red.

Sometimes I really wonder if Suncrest knows what it is doing. In 2012 I tried to purchase 5,000 bags of variety X1012 from your company and I was asked to accept a substitute instead. Your territory salesman told me that there was a severe shortage of X1012 and that he would be unable to get 5,000 bags. He tried to get me to purchase X5543, claiming it was a close substitute. Why can’t you produce enough of what the customer wants?

Thankfully, Rodreguez had a ready reply that addressed at least part of Fishkeg’s concerns:

The 2012 year was tricky. You might recall that the Midwest suffered a severe drought the year before. That wiped out our crop of seed corn in certain parts of the United States, and the seed you wanted was one of those that were wiped out. Since then, we have tried to be more careful about where we plant our seeds.

Climbing back in her car with Snodley and pulling out of the driveway, Rodreguez knew that her answer to Fishkeg was only half the story; the remaining half was about the inherent complexity of the seed corn business.

COMPLEXITY OF Seed Supply and Demand

Corn was one of the biggest crops in the Midwestern United States. Each spring, farmers decided how to allocate their land among a variety of possible crops; if they chose corn, then they had to further decide which varieties (hybrids) to purchase and plant on their land. Seed companies produced and marketed hundreds of different hybrids, which were then sold through a network of independent dealers—often individual farmers who ran side businesses selling various seed varieties and brands to their neighbours.

Hybrids differed in their resistance to diseases and insects, as well as in their performance under different soil and climatic conditions. For instance, certain hybrids were optimized for the shorter, cooler summers common in the Northern Corn Belt, while others were optimized for the longer, hotter summers found in the Southern Corn Belt. Therefore, farmers’ seed choices were highly dependent on their locations.

Furthermore, farmers’ decisions were heavily influenced by their experiences during the previous growing season. For example, if a farmer chose a particular hybrid intended for a cooler, less humid climate, but the weather happened to be abnormally hot and humid during that growing season, the farmer would likely have a much lower yield than expected; hence, the farmer would be less inclined to purchase that hybrid again. Conversely, if the chosen hybrid was optimized for growing conditions as they actually occurred, the farmer would likely repurchase the same hybrid.

Because seed production was a biological process, seeds could not be produced instantaneously, but rather they had to be produced over a long summer growing season. The production of hybrid seed corn involved crossing two genetically different parent inbred plants. To produce the genetic cross (or hybrid) that would be sold as seed corn, the seed company (or its contractor) grew these two parent “inbreds” in the same isolated field, where the possibility of foreign pollen contamination was low. Although it could vary, the planting pattern of the two inbreds was often six consecutive rows of the first inbred (often referred to as the female plant) followed by two rows of the second inbred (the male plant). This pattern was then repeated throughout the field. As the plants matured, the pollen-producing tassels from the female plant were removed in a labour-intensive “detasseling” process, thereby ensuring that the only pollen available to pollinate the female plant came from the male plant. Therefore, the resulting corn that matured on the female plant was a genetic cross of its two parents. Male inbred rows were destroyed following pollination to prevent the possibility that seed from these plants would be mixed in with seed from the female plants. Once corn from the female plants matured, the seed company harvested it and transported it to processing plants where it was dried, removed from the cob, sorted, treated with antifungal or other coatings, bagged, and stored in anticipation for the upcoming selling season.

Due to the nature of this process, Suncrest, along with all other seed companies, had to rely on inventories of seed corn produced in previous growing seasons to fill farmers’ demands for the current growing season. Thus, when Suncrest decided how many acres of parent pairs to plant in 2015, it was actually producing hybrid seed for demand that would occur in 2016. Yet demand for various hybrids could not be predicted with complete certainty. In fact, in the past five years the number of different hybrids produced and marketed had increased greatly, adding to the uncertainty of demand for any one variety. Additionally, because seed production was a biological process at the mercy of the elements, resulting quantities (yields) were influenced by many factors beyond human control (e.g., insects, rain, drought, heat, frosts, and disease pathogens), and yields could not be predicted with complete certainty either.

Suncrest’s Planning Meeting

At Suncrest’s 2015 production planning meeting in December 2014, a new hybrid, “Gaucho,” was the topic of much heated controversy. Lennon Browning, from Marketing, opened the meeting: “We expect the demand of Gaucho for 2015 will be 48,010 bags. This estimate was made by pooling estimates from individual salespeople at the regional level, and then adjusting the resulting aggregate regional sales estimates based on past performance.”

From the Production side, Jim Smith estimated the yield of the new Gaucho hybrid to be 41 bags per acre. He argued that based on his yield figure and the Marketing team’s demand figure, Suncrest should plant 1,171 acres of Gaucho.[[3]](#footnote-3) Although Smith’s analysis was based on both average production yield and expected demand, he realized that both of these items had variation; she had historical data that had been gathered over the past two years on yield for Gaucho and other closely related hybrids in 100 fields (see Exhibit 1). However, he believed that using average yields to determine the acreage was good enough.

Snodley pointed out that Suncrest already had 6,000 bags of Gaucho in inventory from the previous year; because it had already passed the new germination tests, Gaucho was available for sale in 2015.[[4]](#footnote-4) He observed that by planting 1,025 acres (instead of 1,171 acres), the company might still meet demand while enjoying substantial savings, which would occur if actual demand was less than Browning’s estimate and/or yield was higher than 41 bags per acre (see Exhibit 1). Based on an average yield of 41 bags per acre, the overall cost of producing a bag of seed corn was approximately US$46.[[5]](#footnote-5) Thus, Snodley reasoned, if 6,000 fewer bags were produced, Suncrest could save $276,000.

Phillips, from Operations, could see where Snodley was coming from, but thought he was overlooking a couple of factors. First, if Suncrest over-produced and could not sell the resulting yield, there was a total cost per bag of $23 (based on carrying costs, testing costs, re-bagging costs, spoilage costs, etc.) for holding excess inventory until the next year. Second, if Suncrest fell short of meeting the demand, it might end up losing its loyal customers—perhaps permanently. Phillips thought these costs and risks were important and should impact the decision, but could not see where they were included in Snodley’s analysis. He also thought that although putting a dollar amount on the loss from future sales might be difficult, a reasonable alternative might be to produce enough quantity such that the probability of shortage was a low number, such as 15 per cent. On the other hand, his prior field experience suggested that half of the farmers who switched to a competing brand typically did not come back the next year to Suncrest. He wondered whether he should just include a penalty cost for this loss of sales.

“Surely the selling price of $185 per bag is an important factor,” interjected Smith. “Shouldn’t it play a part in the analysis too? Also, I’m not sure about the way you ran the costs to come to a per-bag figure. It seems to me that some of the costs are incurred on a per-acre basis, regardless of how much we actually harvest and process.”

Browning agreed: “Remember the hailstorm last year in Illinois that completely wiped out 1,000 acres? Even though we didn’t harvest a single bag, we still had to pay for the parent seed, for planting it, and so on—in fact, we paid all the involved costs except the actual harvesting and processing costs.”

“I see what you mean,” Snodley conceded.

Although we accountants like to do things this way, it doesn’t make a lot of sense if we can’t guarantee our yields (see Exhibit 2). But if we try to convert all costs into a per-acre basis, it seems to me we’ll just run into the same problem in reverse: if we put processing costs into a per-acre basis, we’ll be saying we pay the same processing costs per acre regardless of the amount harvested—and like Smith said, that can vary.

“I’m not sure we can settle the costing issue right now,” said Browning. “But I’ve got something else to discuss. Historically, we’ve been basing all our production decisions on the demand forecasts from Marketing. As I mentioned earlier, this year’s forecast for Gaucho is 48,010 bags; however, it turns out that our forecasts haven’t always been too accurate.”

Browning was sympathetic, but could not see an easy solution:

The problem is that our salespeople are always complaining that we don’t have enough seed to meet demand for the popular varieties and that our margins are pretty big, and so we need to get product out there to capture demand. In any event, we’ve done a study on how actual sales of various seeds compared to forecasted sales over the past few years. Looking at this data (see Exhibit 3), it seems to me that a strong case can be made for increasing production quite a bit beyond the forecast level. Actual sales exceed forecasted sales frequently, and we need to be sure to have supply on hand to meet that demand when it does happen.

As the meeting adjourned, Snodley continued to mull over the growing list of questions in his mind. How could he put all these moving parts together and determine the right acreage for Gaucho? Was there a magic number?

Exhibit 1: Suncrest Yields (Bags PER Acre) for Production of Gaucho

and related Seeds

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Observation #** | **Bags Harvested** | **Acres Planted** | **Yield (Rounded)** |  | **Observation #** | **Bags Harvested** | **Acres Planted** | **Yield (Rounded)** |
| 1 | 10,168 | 210 | 48 |  | 51 | 33,012 | 739 | 45 |
| 2 | 10,880 | 210 | 52 |  | 52 | 33,472 | 1,085 | 31 |
| 3 | 11,949 | 266 | 45 |  | 53 | 33,689 | 788 | 43 |
| 4 | 12,357 | 290 | 43 |  | 54 | 33,958 | 1,004 | 34 |
| 5 | 12,849 | 288 | 45 |  | 55 | 34,384 | 730 | 47 |
| 6 | 12,984 | 339 | 38 |  | 56 | 34,502 | 680 | 51 |
| 7 | 13,289 | 330 | 40 |  | 57 | 34,820 | 1,166 | 30 |
| 8 | 13,435 | 290 | 46 |  | 58 | 35,130 | 730 | 48 |
| 9 | 13,554 | 326 | 42 |  | 59 | 35,153 | 762 | 46 |
| 10 | 13,647 | 348 | 39 |  | 60 | 35,607 | 833 | 43 |
| 11 | 14,089 | 280 | 50 |  | 61 | 36,108 | 826 | 44 |
| 12 | 15,086 | 449 | 34 |  | 62 | 36,187 | 926 | 39 |
| 13 | 15,418 | 344 | 45 |  | 63 | 36,692 | 779 | 47 |
| 14 | 15,747 | 312 | 51 |  | 64 | 36,773 | 965 | 38 |
| 15 | 15,834 | 445 | 36 |  | 65 | 37,679 | 901 | 42 |
| 16 | 17,331 | 530 | 33 |  | 66 | 39,698 | 1,246 | 32 |
| 17 | 17,796 | 453 | 39 |  | 67 | 39,879 | 796 | 50 |
| 18 | 18,150 | 488 | 37 |  | 68 | 39,973 | 1,022 | 39 |
| 19 | 18,529 | 424 | 44 |  | 69 | 40,533 | 1,123 | 36 |
| 20 | 18,758 | 451 | 42 |  | 70 | 40,663 | 863 | 47 |
| 21 | 19,009 | 468 | 41 |  | 71 | 40,908 | 790 | 52 |
| 22 | 19,528 | 413 | 47 |  | 72 | 40,938 | 1,103 | 37 |
| 23 | 19,692 | 502 | 39 |  | 73 | 41,204 | 1,009 | 41 |
| 24 | 20,481 | 666 | 31 |  | 74 | 41,562 | 1,390 | 30 |
| 25 | 21,190 | 570 | 37 |  | 75 | 41,672 | 1,020 | 41 |
| 26 | 21,556 | 639 | 34 |  | 76 | 43,167 | 879 | 49 |
| 27 | 21,922 | 761 | 29 |  | 77 | 43,210 | 987 | 44 |
| 28 | 22,023 | 592 | 37 |  | 78 | 46,829 | 1,119 | 42 |
| 29 | 22,037 | 635 | 35 |  | 79 | 47,334 | 1,131 | 42 |
| 30 | 22,894 | 537 | 43 |  | 80 | 47,375 | 1,244 | 38 |
| 31 | 23,308 | 546 | 43 |  | 81 | 47,601 | 1,319 | 36 |
| 32 | 23,822 | 624 | 38 |  | 82 | 47,865 | 1,201 | 40 |
| 33 | 25,316 | 631 | 40 |  | 83 | 48,472 | 1,186 | 41 |
| 34 | 26,258 | 654 | 40 |  | 84 | 49,248 | 1,365 | 36 |
| 35 | 26,765 | 667 | 40 |  | 85 | 49,396 | 1,416 | 35 |
| 36 | 27,124 | 515 | 53 |  | 86 | 50,091 | 1,197 | 42 |
| 37 | 28,221 | 722 | 39 |  | 87 | 50,124 | 1,227 | 41 |
| 38 | 29,050 | 835 | 35 |  | 88 | 51,181 | 1,770 | 29 |
| 39 | 29,249 | 865 | 34 |  | 89 | 52,030 | 1,273 | 41 |
| 40 | 29,347 | 720 | 41 |  | 90 | 52,332 | 1,280 | 41 |
| 41 | 29,627 | 739 | 40 |  | 91 | 52,782 | 1,232 | 43 |
| 42 | 29,837 | 763 | 39 |  | 92 | 53,144 | 1,006 | 53 |
| 43 | 30,550 | 960 | 32 |  | 93 | 53,384 | 1,087 | 49 |
| 44 | 30,878 | 941 | 33 |  | 94 | 53,536 | 1,336 | 40 |
| 45 | 31,390 | 751 | 42 |  | 95 | 55,592 | 1,298 | 43 |
| 46 | 31,618 | 657 | 48 |  | 96 | 55,880 | 1,334 | 42 |
| 47 | 31,837 | 794 | 40 |  | 97 | 57,217 | 1,640 | 35 |
| 48 | 31,932 | 731 | 44 |  | 98 | 57,274 | 1,250 | 46 |
| 49 | 32,173 | 823 | 39 |  | 99 | 59,415 | 1,387 | 43 |
| 50 | 32,908 | 713 | 46 |  | 100 | 59,740 | 1,243 | 48 |

Source: Company materials.

Exhibit 2: Production Costs for Seed Corn

|  |  |
| --- | --- |
| Description of Cost | Cost (US$) |
| Field preparation (prior to planting) | $200/acre |
| Seed costs (cost of producing/purchasing parent stock seeds) | $500/acre |
| Planting costs (fuel, labour, equipment depreciation, etc.) | $150/acre |
| Silvicultural costs (weed control, fertilizer, etc.) | $350/acre |
| Land rent | $200/acre |
| Processing costs (harvesting, drying, shelling, sorting, testing, bagging, etc.) | $12/bag |

Source: Company materials.

Exhibit 3: Actual versus Forecasted Sales (in bags) for Hybrid seeds

Similar to gaucho, 2009–2012

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Actual** | **Forecast** | **Actual** | **Forecast** | **Actual** | **Forecast** | **Actual** | **Forecast** | **Actual** | **Forecast** |
| 129,245 | 881,216 | 134,090 | 142,386 | 142,825 | 252,341 | 123,847 | 486,629 | 75,068 | 140,799 |
| 68,961 | 74,007 | 114,294 | 136,418 | 102,989 | 115,072 | 58,233 | 154,629 | 59,115 | 69,721 |
| 141,701 | 136,251 | 76,037 | 105,364 | 146,368 | 171,478 | 56,082 | 56,489 | 138,534 | 550,643 |
| 67,331 | 99,017 | 112,348 | 112,677 | 136,997 | 134,048 | 48,254 | 420,844 | 87,909 | 106,982 |
| 84,314 | 181,973 | 106,242 | 89,405 | 65,934 | 63,852 | 55,403 | 70,122 | 111,968 | 153,956 |
| 112,460 | 113,724 | 81,233 | 112,046 | 116,385 | 248,415 | 90,173 | 310,844 | 113,242 | 280,002 |
| 104,252 | 87,168 | 100,277 | 190,597 | 41,347 | 63,013 | 118,340 | 131,543 | 84,202 | 113,201 |
| 117,068 | 96,591 | 130,141 | 225,783 | 99,447 | 403,928 | 99,825 | 132,609 | 112,448 | 210,354 |
| 40,055 | 32,407 | 53,458 | 106,916 | 124,037 | 253,241 | 91746 | 592,547 | 89,690 | 83,671 |
| 59,291 | 57,194 | 130,911 | 312,885 | 61,153 | 87,587 | 58,803 | 84,660 | 113,681 | 465,511 |
| 104,062 | 39,024 | 136,001 | 458,843 | 128,732 | 141,371 | 148,359 | 190,103 | 98,750 | 107,303 |
| 121,634 | 108,120 | 76,236 | 69,534 | 74,207 | 22,697 | 112,841 | 171,166 | 95,302 | 241,063 |
| 105,174 | 82,896 | 85,285 | 85,780 | 72,889 | 73,999 | 98,300 | 102,370 | 113,966 | 128,219 |
| 49,915 | 48,344 | 76,090 | 57,832 | 110,734 | 110,163 | 79,356 | 341,599 | 45,909 | 50,054 |
| 88,288 | 62,705 | 88,944 | 7,623,772 | 92,736 | 273,033 | 44,735 | 70,569 | 126,841 | 199,183 |
| 93,397 | 91,120 | 45,608 | 174,744 | 99,549 | 327,285 | 149,838 | 152,220 | 95,140 | 153,538 |
| 106,963 | 473,288 | 142,246 | 376,313 | 130,207 | 207,336 | 114,289 | 95,944 | 59,508 | 61,116 |
| 130,548 | 219,041 | 136,319 | 224,332 | 44,030 | 44,860 | 130,768 | 141,132 | 140,654 | 158,674 |
| 88,143 | 78,489 | 120,210 | 110,319 | 49,344 | 111,765 | 50,108 | 89,095 | 121,949 | 407,775 |
| 99,886 | 382,705 | 98,137 | 94,880 | 91,348 | 147,820 | 118,133 | 421,904 | 119,261 | 79,788 |
| 141,546 | 172,426 | 124,156 | 48,740 | 110,971 | 112,619 | 48,846 | 83,072 | 121,627 | 193,428 |
| 82,200 | 59,802 | 127,959 | 163,492 | 108,797 | 139,925 | 40,978 | 62,328 | 145,873 | 140,739 |
| 139,161 | 164,423 | 71,169 | 91,911 | 96,085 | 426,316 | 103,849 | 330,099 | 117,998 | 151,383 |
| 92,339 | 127,445 | 49,527 | 124,521 | 103,274 | 118,887 | 123,607 | 113,049 | 146,795 | 196,038 |
| 52,130 | 57,603 | 133,975 | 150,972 | 82,930 | 207,104 | 126,534 | 165,887 | 43,180 | 68,569 |
| 68,243 | 65,201 | 92,374 | 101,685 | 54,314 | 31,463 | 46,778 | 54,362 | 60,457 | 75,347 |
| 133,604 | 119,290 | 72,038 | 86,164 | 65,679 | 69,681 | 79,461 | 95,910 | 111,257 | 258,430 |
| 73,846 | 58,253 | 108,663 | 123,771 | 143,466 | 300,017 | 76,888 | 31,542 | 57,170 | 46,946 |
| 41,832 | 263,806 | 98,825 | 248,840 | 128,481 | 205,111 | 116,674 | 596,171 | 67,479 | 88,750 |
| 127,963 | 165,725 | 66,523 | 102,209 | 139,018 | 491,230 | 122,286 | 102,833 | 103,225 | 139,298 |
| 117,765 | 113,086 | 70,427 | 69,671 | 118,283 | 142,725 | 129,804 | 184,597 | 42,822 | 90,495 |
| 56,716 | 58,672 | 126,752 | 279,772 | 87,445 | 93,863 | 48,756 | 61,726 | 63,728 | 210,992 |
| 111,910 | 130,838 | 100,466 | 110,538 | 61,404 | 104,996 | 43,799 | 42,780 | 122,071 | 173,352 |
| 93,657 | 119,499 | 115,024 | 97,882 | 68,856 | 147,910 | 85,360 | 182980 | 110,789 | 469,383 |
| 132,418 | 104,460 | 89,381 | 91,421 | 98,087 | 284,036 | 43,644 | 48,877 | 76,978 | 168,353 |
| 83,515 | 79,897 | 45,759 | 234,062 | 78,575 | 139,648 | 109,414 | 229,567 | 119,754 | 162,462 |
| 77,717 | 40,268 | 86,707 | 120,804 | 68,140 | 225,854 | 107,823 | 276,215 | 120,207 | 131,786 |
| 114,712 | 1,509,369 | 73,766 | 66,682 | 110,558 | 137,733 | 100,056 | 260,529 | 63,796 | 44,275 |
| 111,081 | 90,421 | 143,560 | 112,179 | 120,673 | 187,702 | 48,452 | 53,773 |  |  |
| 83,819 | 146,027 | 60,189 | 116,364 | 133,168 | 296,853 | 139,290 | 1483,124 |  |  |
| 95,389 | 380,795 | 118,345 | 93,425 | 80,583 | 1022,627 | 142,151 | 141,775 |  |  |
| 84,619 | 80,437 | 143,064 | 130,922 | 103,580 | 548,043 | 88,309 | 313,999 |  |  |

Source: Company materials.

1. A bag of seed corn contains approximately 80,000 kernels and weights approximately 50 pounds (22.68 kilograms). [↑](#footnote-ref-1)
2. 1 acres = 0.41 hectares. [↑](#footnote-ref-2)
3. 1,171 acres = 48,010 bags (at 41 bags per acre). [↑](#footnote-ref-3)
4. A fraction of seed carried in inventory from one year to the next did not germinate; thus, this “carry-over seed” had to be tested via a sampling process and could not be sold unless the estimated percentage of “good” seed exceeded a certain limit. [↑](#footnote-ref-4)
5. All currency amounts are in US$ unless otherwise specified. [↑](#footnote-ref-5)