

ESCAgenetics' success with true potato seed

Why would any company dedicate 14 years and millions of dollars to a product that is destined not to be patented and that is sold largely in volatile, hard-to-penetrate foreign markets? ESCAgenetics (San Carlos, CA) and its subsidiary, TPS Products, have done just that to develop true seed for planting potatoes. Are they lunatics? Or is there method to their apparent madness?

The common potato—destined to become a staple second to none—was first domesticated in antiquity by Indians on the high slopes of the Andes. Unknown benefactors introduced the “Irish” potato into Spain in the sixteenth century, long before it had seen Ireland. It then spread epidemically throughout the European continent. The potato became so important in Ireland that its failure from blight in the 1840s caused the wholesale migration of the overcrowded Irish to new countries, forever affecting the fortunes of the U.S. and Australia. The potato also kept Germany alive during two world wars. Potatoes, moreover, have been denounced by Scottish rectors as unfit for consumption by Christians—because they are not mentioned in the Bible—and they have been blessed by Russia's Frederick the Great and France's Marie Antoinette.

Blessing or Curse

Today, potatoes are the fourth largest field crop—and the largest single vegetable crop—in the world. They occupy approximately 50 million acres. Almost 90 percent of the production is concentrated in Europe, the Commonwealth of Independent States, and China. The U.S. contributes a measly, but important, 6 percent of production, as its potatoes are the critical ingredient in the \$12 billion U.S. market for snack chips, as well as a primary source for starch, dextrins, and alcohols.

Everyone knows that the sprouts, or eyes, of potatoes can grow into whole plants that produce more potatoes. Indeed, the ease of propagating the potato has generally been a blessing for potato growers and a

curse for potato geneticists. First, traditional potato tubers for planting mature into a crop that is uniform and consistent in size, color, shape, and yield. However, because the crop, as well as the tubers for planting, are vegetatively reproduced for many generations, they become a storehouse of viruses and fungi. Over time, both the stock and crop degenerate in yield and quality. This problem is addressed by producing minitubers for planting from small, disease-free, tissue-cultured plantlets, which are raised under sterile conditions. In fact, several biotechnology companies—including AgriDyne (Salt Lake City, UT) and Calgene (Davis, CA)—are active in this area. Disease-free tubers are then exported to potato-producing countries. Still, in many areas of the world, it is uneconomical to import, or even produce, such tubers. Second, due to vegetative propagation, new potato varieties are excluded from protection under various plant patent acts. Even if patents were available for new potato varieties, developers have no practical protection because of the ease with which the new lines may be propagated. Everyone with a potato in the cupboard is a potential thief. Another problem with potatoes is weight, as they are 87 percent water. About 1 ton of tubers are required to plant 1 acre of potatoes. Substantial costs are incurred in tuber production, transportation, and storage. By comparison, corn and wheat each require about 20 pounds of seed per acre.

Shrewd

What's needed is a tiny, true potato seed that can be bred, produced, and distributed like any other small vegetable seed. I believe that ESCAgenetics is Johnny-on-the-spot. Over 15 years ago, the firm found that potatoes can be encouraged to set seed. These tiny seeds, which look like diminutive versions of tomato or tobacco seed, are born on the stems of potato plants in fruits that resemble green cherry tomatoes. Each plant produces several hundred thousand potato seeds.

If a potato crop is seeded directly with ESCAgenetics' creation, only 3–4 ounces of seed are needed, not the usual ton of tubers.

So why has ESCAgenetics spent 14 years and millions of dollars on true potato seed? They are addressing the \$8 billion potato-planting market. Currently, the value of minitubers is about \$3 billion, and the value of plant-back tubers contributes another \$5 billion. In fact, ESCAgenetics has carved out a 14-year lead that would be hard for competitors to duplicate and that would make any competitor with a comparable product suspect. Also, the firm's lack of patent protection for new varieties is not particularly disturbing. After all, many of the methods for improving and producing this novel type of seed can be patented. ESCAgenetics is creating competitive insulation by building brand recognition and loyalty. No one can replace the years of customer cultivation and scrutiny that ESCAgenetics has had to endure to get seed distributors and potato growers worldwide to try the product. ESCAgenetics' position in those volatile, non-U.S. markets is imminently sensible. It has gone to countries where demand for increased potato productivity is the greatest and where its low-cost seeding system fits. Through specialized distributors, ESCAgenetics is meeting the market in over a dozen countries, such as Brazil, Spain, and Egypt, as well as Indonesia and the Ukraine.

Throughout the late 1980s, ESCAgenetics partnered with Pioneer Hi-Bred International (Des Moines, IA) to develop true potato seed. In 1990, Pioneer dropped out, and ESCAgenetics reclaimed full control of the program. Many in the industry scored true potato seed as a potential loser because of Pioneer's exit. In fact, the absence of Pioneer's interest in true potato seed eliminates it as a competitor and clears the way for ESCAgenetics to run with the product.

So, what's the one word I would use to describe the “lunatics” at ESCAgenetics? Shrewd. ///



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