ADVANTAGES OF A TRUE POTATO SEED (TPS) TECHNOLOGY

by
Mario S. Sepulveda
Vice President Agriculture, ESCAgenetics Corporation
General Manager, TPS Products Co.

Although potato is only the fourth largest planted crop in the world after wheat, rice and corn, in terms of planting costs per unit area, it ranks the first. To the ware potato farmer, seed tuber cost represents, depending on the country, 35% to 60% of the total agricultural cost. Certified seed tubers are sought after by farmers around the world, yet their high cost limits their use to only 8% of the total seed tuber market on a world wide basis.

A traditional clonal crop, using the limited generation seed production system (through minitubers), brings as advantages the high yield of the varieties, the high uniformity of the product and, surely a simpler procedure of growing by handling seed tubers. The disadvantages of such a crop are: high disease risk by clonal reproduction (all the major diseases are transmitted through tubers), high volume of seed tubers to handle for a land unit, problems of storage and transportation, high cost of seed tubers, a limited availability (storability) of the seed tubers with an optimum physiological age, low adaptability of clonal varieties.

The new hybrid crop, which is proposed, reduces the disease risk by sexual reproduction (no major diseases are transmitted through botanical seed), requires very low volumes of true potato seed (TPS) per land unit, does not bring any problems of storage (can be stored at any temperature above 40°F) and transportation (because of the small volume). The seed tubers produced from seedlings have a low cost (which in the following vegetative generation is comparable with generation 4-6 in the limited generation program). No optimum physiological restrictions associated with TPS are involved and the hybrids have a high capacity of adaptation (because of the population structure which will always provide individuals reacting favorably to the conditions of a certain year, while a clonal variety will be either a success or a total failure).

The TPS crop implies some specifics which might be disadvantageous as: the lower yield of the seedlings, the lower product uniformity (due to the hybrid structure) and the more difficult procedures of growing seedlings. All these problems have been solved by the breeding and crop technology programs of TPS Products Co., a subsidiary of ESCAgenetics Corporation in San Carlos, California, as a result of a 14 year activity. The high quality disease free proprietary TPS hybrids are produced at a fraction of the cost of nuclear seed tubers.

This Presentation is part of the Proceedings of the 1994 Washington State Potato Conference & Trade Fair.

The general objectives of our breeding program are: tuber yields comparable to the best clonal varieties; high uniformity of the product, fresh and processed; high botanical seed yields per mother plant; good resistance to diseases. The specific objectives answer the requirements of fresh market (white skin with white or yellow flesh) and of French fry and chips market (good solids and fry color, no defects). The results of the breeding trials in 1993 are presented in Table 1:

Table 1

PERFORMANCE OF SOME TPS HYBRIDS IN 1993
IN HALF MOON BAY (CA), PRESQUE ISLE (ME) AND ABERDEEN (ID)

	US#1 Yield (t/ha)*			Spec.Gravity			Fry Color (0-4)		
Cultivar	CA	ME	ID	CA	ME	ID	CA	ME	ID
88.EX.2**	23.9	31.8	42.9	71.8	86.0	84.0	0.3	2.1	3.5
89F.WW.105**	22.9	35.5	41.1	78.8	81.5	79.0	0.1	2.2	2.5
88.WR.49***	18.7	31.9	40.4	76.3	78.3	79.0	0.0	1.0	1.8
89F.WW.101***	25.9	41.1	53.3	76.8	91.0	84.0	0.6	1.3	1.7
ATLANTIC	25.6	-	-	84.0	91.0	96.0	0.1	1.0	1.2
KENNEBEC	31.7	-	-	77.8	-	-	0.0	-	-
SUPERIOR	11.6	27.3	32.9	78.8	78.3	74.0	0.1	2.0	3.0
R.BURBANK	19.9	-	-	77.5	-	88.0	0.0	-	2.1
KATAHDIN	-	34.7	42.0	-	78.0	77.0	-	2.0	3.8
LSD 5%	7.0	4.9	6.9	0.6	5.0	0.6	0.4	0.5	0.6

* 8.922 x t/ha = cwt/A ** for French fries *** for chips

Processing conditions: CA - freshly harvested; ME - 3 months at 60°F without reconditioning; ID - 3.5 months at 45°F-55°F without reconditioning.