10. VARIOUS PROBLEMS IN THE BREEDING OF MAIZE IN THE PHILIPPINES

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Introduction

The most important problem of corn cultivation in the Philippines is how to attain national self-sufficiency. This may be solved by using improved varieties which can have appreciable increments. These increments when added to the normal production plus carry over stock could establish a corn supply sufficient to meet the consumption requirements as indicated below (in metric tons):

Items	*1969*	*1970*	*1971*
I. The Corn Supply	*2,187,020*	*2,309,270*	*2,435,480*
a. Normal production*	1,519,610	1,557,600	1,596,540
b. Incremental output**	541,500	627,000	712,500
c. Carry-over stock	125,910	125,120	126,440
II. Corn Consumption	*2,061,900*	*2,183,280*	*2,309,080*
a. Human food	906,770	939,170	973,350
b. Animal feed	978,900	1,059,100	1,142,800
c. Industrial uses	53,170	57,020	59,870
d. Seeds, wastes, others	123,060	127,990	133,060

Development of New Corn Varieties and Hybrids

The problems presented to corn breeders by the Corn Production Program are: (1) continuing search for white corn varieties which are used as food, (2) improvement of the yellow semi-dents which are very productive to make them acceptable to feed millers, (3) development of starchy type of corn which shall supply the requirement of the starch manufacturers and (4) locally produced sweet corn hybrid.

Continuing search for improved varieties or hybrids of white corn for food. Hybrids and synthetic varieties produced by breeding are either slightly flinty or semi-dents. The preference of both the millers and consumers of corn as food is for flinty type because of their high milling recovery and the semblance to rice grains. The two varieties approved by the Philippine Seed Board*** for food production are UPCA VAR-2 and UPCA VAR-4 which are slightly flinty.

Both the U.P. College of Agriculture and the Bureau of Plant Industry are pro-

* Projections from 1961 to 1968 production.

** 1.425 metric tons per hectare in 380,000, 440,000, and 500,000 hectares in 1969, 1970 and 1971, respectivery.

*** A body to approve for certification plant varieties that are found to be outstanding. It is composed of the Dean of the U.P. College of Agriculture, the Director of Plant Industry and the Commissioner of Agricultural Productivity.

ducing new synthetics. The new varieties and hybrids are placed in advanced trials in Ilagan Experiment Station for Northern Luzon, Central Experiment Station of the University of the Philippines College of Agriculture for Southern Luzon; La Granja Experiment Station, Mandawe Experiment Station and Central Philippine University for Visayan Islands; and Aroman Experiment Station and Central Mindanao State University for Mindanao Island (see Figure 1). Every year the Philippine Seed Board evaluates the data gathered and determines the varieties for exclusion and or inclusion in the list of approved varieties for seed certification.

Yellow semi-dents for animal feeds. Two varieties are approved by the Philippine Seed Board for certification. They are the UPCA VAR-1 and UPCA VAR-3. Both are yellow, semi-dents and yield from two to three metric tons of shelled grains per hectare. The increased demand for corn as brought about by the expansion of the livestock in-

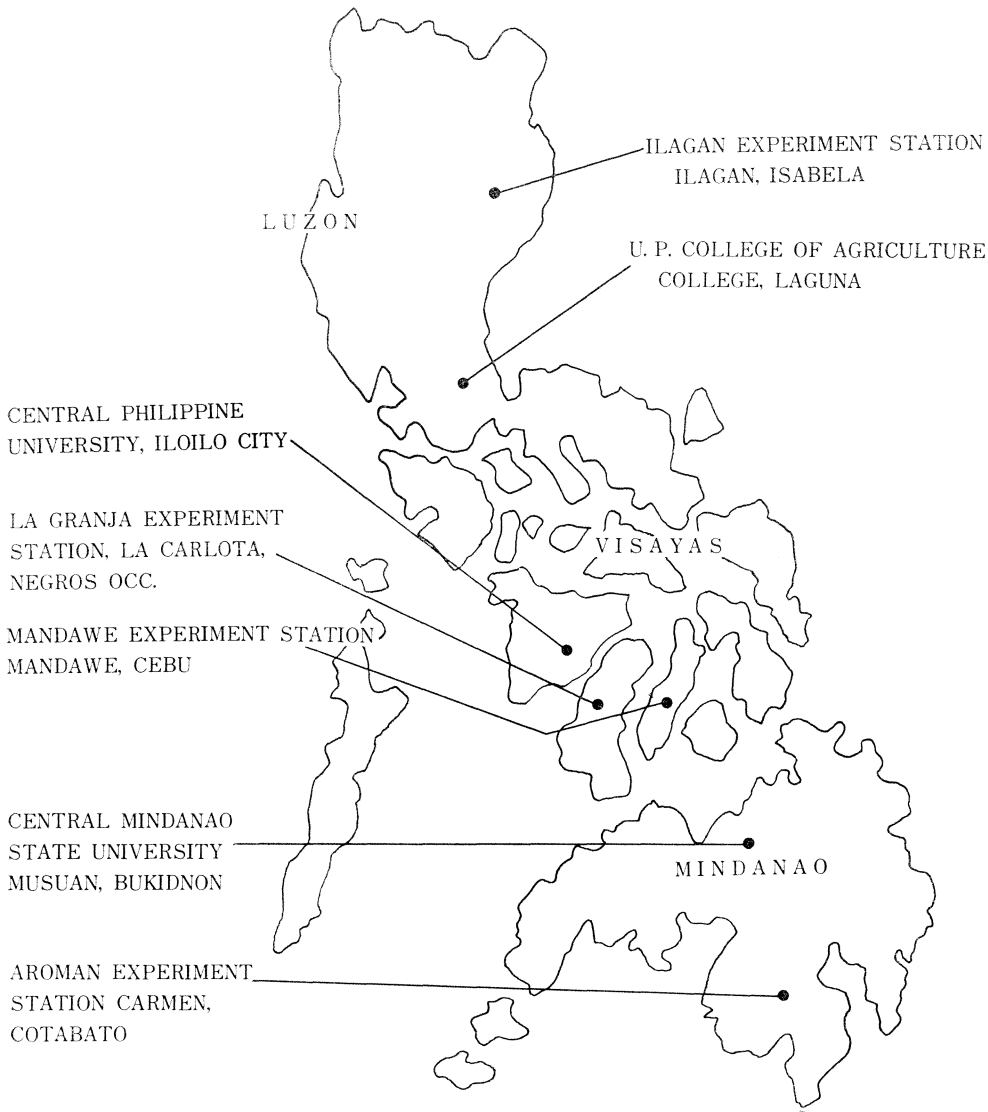

Figure 1. Corn testing stations of the Philippines.

dustry may oblige the feed millers to accept the above named two varieties.

A continuing search for the flinty types of yellow corn which may equal or surpass the yield of the two approved varieties is also in progress.

Breeding for starchy corn. Attention to this phase of breeding work has been called for in view of the establishment of starch factories in the country. The work along this line is starting.

Sweet corn improvement. Introduction of sweet corn varieties and hybrids from the United States of America showed some success but Pythium root rot (*Pythium arrhenomanes* Drechler) outbreaks caused heavy losses on these introductions. The Philippine Hybrid 801, a single cross hybrid of sweet corn, was developed and found adopted to Philippine climatic conditions. This sweet corn hybrid has a parent inbred that has very poor seed setting and used only as the pollen parent. As the breeding process cannot be reversed in the production of hybrid seed, seed production becomes expensive. Desirable parents for hybrid sweet corn seed production are being developed.

Slow Acceptance of the Improved Variety by Farmers

The native corn varieties. As a result of natural selection, native corn varieties are relatively more resistant to downy mildew (*Sclerospora spontanea* Weston and *S. philippenensis* Weston) and corn blight (*Helminthosporium turcicum* Pass.) more tolerant to corn stem borer (*Ostrinia damoalis* Walker) than the introduced varieties. The grains are flinty with high milling recovery. The grain color is generally yellow or white. However, the yields ranged only from 600 to 700 kilograms per hectare. Inbreds of native varieties when crossed do not result to increased productivity of the progeny.

The improved varieties. The improved varieties intended for food or for feed which are UPCA Varieties 1, 2, 3 and 4, as stated elsewhere, are adapted to Philippine climatic conditions. The grains are semi-dents or slightly flinty. UPCA VAR-1 and UPCA VAR-3 are yellow and UPCA VAR-2 and UPCA VAR-4 are white. The yields vary from two to three metric tons per hectare when fully fertilized.

The minimum yield of the improved varieties of two tons per hectare when obtained from the 2.3 million hectares of corn field planted each year in the Philippines will result to the annual production of 4.6 million tons which is more than enough to meet the consumption requirement of just over two million metric tons.

The problem faced by the corn production program is how to make the consumers or users of corn accept willingly these improved varieties.

Other Problems in the Use of Corn Synthetic Varieties

The problems in seed production are less in growing corn synthetic varieties than when double cross hybrids are used. Maintenance of inbreds, production of single crosses and finally the formation of the double cross seeds have been eliminated. Proper isolation and mass selection has kept the productive capacity of the synthetic varieties.

The problems arising from the use of synthetic varieties for planting are: (1) supply of seeds in quantities sufficient to meet the farmers' requirements; (2) checking up the productive capacity of each of the synthetic varieties; (3) maintenance of high yields of synthetics by proper fertilizer recommendations; and (4) sufficient number of personnel to solve the first three problems.

Supplying the farmers with corn synthetic seeds. Shown in Appendix 1 are the taget areas in each province for the planting of improved varieties. Corn is planted twice or three times a year in some provinces. For every 300 hectares of corn planted in each season, one corn seed producer is assigned to provide seeds of about 4.5 metric

tons. The arrangement is working conveniently in areas where the program has gained ground for at least one year. In the first year of the program, the government, through the Bureau of Plant Industry, procures certified seeds and distribute them in the provinces newly included in the corn program.

Checking the productive capacity of the synthetic varieties. Variety test for yield is conducted in each province. The seeds of the synthetic varieties produced in each province are planted in variety test plots where the native varieties are used as control plots. The outstanding synthetic variety or varieties are increased for general culture in the province.

Fertilizer trials per province. Two fertilizer trials in each province are being conducted to obtain the fertilizer recommendations that will give the maximum return with the use of the synthetic varieties found best for the province.

Technical personnel for the program. The improved varieties found best in each province will give maximum benefit to the farmers when he is assisted by production technicians assigned in the area. One production technician covers 300 hectares more or less and assist about 150 farmers. The production technicians assist the corn farmer in obtaining production loans, give technical advice both on seed production and in growing the crop as well as helping the farmers market the produce.

The competence of the corn production technicians determines to a great extent the success in obtaining the incremental output that is expected from the use of the improved varieties of corn.

Discussion

K. Asano, Japan: To all delegates—Do you bring samples of varieties of maize in your country? If yes, please show us them.

Answer: No.

Appendix 1. Target areas under the expanded corn program.

(n hectares)

Island region	Province	1968	1969	1970	1971
LUZON	1. ABRA	—	1,150	1,200	1,350
	2. ALBAY	248	2,356	2,728	3,100
	3. BATAAN	—	500	750	1,000
	4. BATAGAS	125	3,173	3,674	5,175
	5. CAGAYAN	4,464	6,748	6,800	7,900
	6. CATANDUANES	—	1,425	1,550	1,600
	7. CAMARINES NORTE	—	300	350	400
	8. CAMARINES SUR	2,570	4,978	5,764	6,550
	9. CAVITE	—	500	600	700
	10. ILOCOS SUR	—	270	300	350
	11. ISABELA	4,460	3,000	4,000	4,000
	12. LAGUNA	—	1,000	2,500	2,500
	13. MASBATE	1,232	4,852	6,000	7,000
	14. MINDORO ORIENTAL	1,200	9,000	10,000	12,000
	15. NUEVA ECIJA	280	1,300	1,500	2,000
	16. PANGASINAN	1,730	2,500	2,700	3,000
	17. RIZAL	—	100	200	300
	18. SORSOGON	300	2,200	3,000	5,000
	SUB-TOTAL	16,609	45,352	53,616	63,925
VISAYAS	1. BOHOL	548	5,206	6,028	6,850
	2. CEBU	10,380	4,201	5,000	6,000
	3. ILOILO	2,970	7,562	8,756	9,950
	4. LEYTE	1,732	16,454	19,052	21,650
	5. LEYTE DEL SUR	380	4,220	4,220	4,750
	6. NEGROS OCCIDENTAL	7,640	7,560	10,724	18,550
	7. NEGROS ORIENTAL	6,750	18,000	22,000	25,000
	8. SAMAR, EASTERN	200	200	500	750
	9. SAMAR, NORTHERN	200	874	1,012	1,150
	10. SAMAR, WESTERN	368	1,748	2,024	2,300
	SUB-TOTAL	31,168	66,025	79,316	96,950
MINDANAO	1. AGUSAN	1,200	8,376	8,888	10,000
	2. BUKIDNON	14,740	15,276	17,688	20,100
	3. COTABATO	29,200	74,920	78,000	80,000
	4. DAVAO DEL NORTE	7,000	95,150	96,000	97,000
	5. DAVAO ORIENTAL	4,000	11,612	12,000	15,000
	6. DAVAO DEL SUR	7,000	20,300	20,000	23,000
	7. LANAO DEL NORTE	1,884	7,898	10,724	18,550
	8. MISAMIS OCCIDENTAL	512	4,865	5,632	6,400
	9. MISAMIS ORIENTAL	2,411	10,000	11,000	12,000
	10. SURIGAO DEL SUR	—	2,410	3,000	4,000
	11. ZAMBOANGA NORTE	1,216	11,552	13,376	15,200
	12. ZAMBOANGA SUR	3,060	29,070	33,660	38,250
	SUB-TOTAL	72,223	291,429	309,698	339,500
GRAND-TOTAL		120,000	402,806	442,900	500,375