

Maturity Pattern of 2B-Bushy Pigeon Peas¹

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ABSTRACT

The maturity pattern of 2B-Bushy pigeon peas when planted at Isabela and Fortuna Substations was studied. The canning size yields and the canned pack grade were determined throughout the production stage. Maturity curves and the canned pack grades at several points in the curves are presented. At the peak of the curve the canning grade was either A or B, with the alcohol insoluble solids content ranging from 21.12 to 29.19%. Beyond an alcohol insoluble solids content of 30.0%, only C or substandard canned peas could be obtained.

INTRODUCTION

2B-Bushy is a new experimental pigeon pea line. It is considered suitable for mechanical harvesting because it has a determinate flowering and fruit bearing period. This pigeon pea was developed at Isabela Substation by Abrams. Sánchez Nieva et al. (2) studied the variations of the stage of maturity during the harvesting season, the effect of the variation upon the quality of the canned pack (1) and the effect of the harvesting method upon the canning process (3) of Saragateado and Kaki, two indeterminate varieties. In no instance, however, was the maturity pattern described in terms of canning size yields and pack quality throughout the whole stage of production. In all cases the sampling was initiated when according to the investigators sight judgment, the plantings were reaching full stage of maturity. This paper presents the maturity pattern of 2B-Bushy pigeon peas planted at Isabela and Fortuna Substations and this variety's canning quality throughout the whole stage of production.

MATERIALS AND METHODS

For these studies, one-acre plots of 2B-Bushy pigeon peas were planted during three consecutive years at Isabela (1976, 1977, 1978) and for two consecutive years at Fortuna (1977, 1978). The plots were planted from July to August at Isabela and from August to September at Fortuna. Randomized samples were picked from the plots at regular intervals starting around 15 days after peak flowering and from there on until the completion of 10-15 samples. During sampling, all pods, no matter their

¹ Manuscript submitted to Editorial Board August 20, 1979.

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stage of development, were gathered. During each sampling date two samples were collected simultaneously, one consisting of 15 and the other of 150 plants selected at random. The sample of the 15 plants was hand-shelled and graded with staggered mesh sieves sizes 12/32", 11/32", 10/32" and 9/32". Each portion was weighed and the seeds counted. Alcohol-insoluble solids were determined by the modified AOAC method as described by Sánchez et al. (2). The other sample was processed and canned by the improved method described by Sánchez et al. (4). Canned samples were graded according to USDA standards by a USDA inspector.

RESULTS AND DISCUSSIONS

The results obtained indicate that 2B-Bushy pigeon peas follow a maturity pattern as shown in figure 1. This figure shows how the percentage of canning size peas (w/w) varied throughout the whole production stage. Canning size peas are peas which do not pass through a 10/32" sieve. The peaks of the curves came within a span of 8 days. The first peak came 18 days after the first sample was picked and the last 26

TABLE 1.—Average temperatures and rain during the experiments

Year	Maximum temperatures (°F)		Rain (inches)	
	Fortuna	Isabela	Fortuna	Isabela
1976	80.0	76.0	3.48	3.87
1977	80.3	77.2	3.44	5.20
1978	88.9	85.1	1.96	6.60

days after first sample was picked. The intention was to pick the first sample of each experiment 15 days after peak flowering, but there is no reliable way to determine the peak flowering date. It is clear that all first samples did not have the same stage of maturity. This may be one of the reasons why all the peaks do not coincide; other reasons may be weather and soil variations. The range of the highest yield values was from 77.24 to 88.18% (w/w). In all cases the canned peas corresponding to samples gathered at the peak points in the curves were of A or B grade. The B grade in most cases was due to an excess of the loose skins not permissible for an A grade. There are excessive loose seed coats when young and tender peas split and the cotyledons separate from the seed coat. The 1977 and 1978 Isabela experiments seem to have been adversely affected. The little change after peak yield, a decrease of 3.76% in 14 days and 3.0% in 7 days, suggest that either the plants continued producing tender green peas or the green mature ones failed to ripen and dried as expected, or both. The authors suspect that the variations from the expected were caused by the rain pattern, which was different from Fortuna's 1977, 1978 and Isabela's 1976 pattern, as shown in table 1. Although in general the

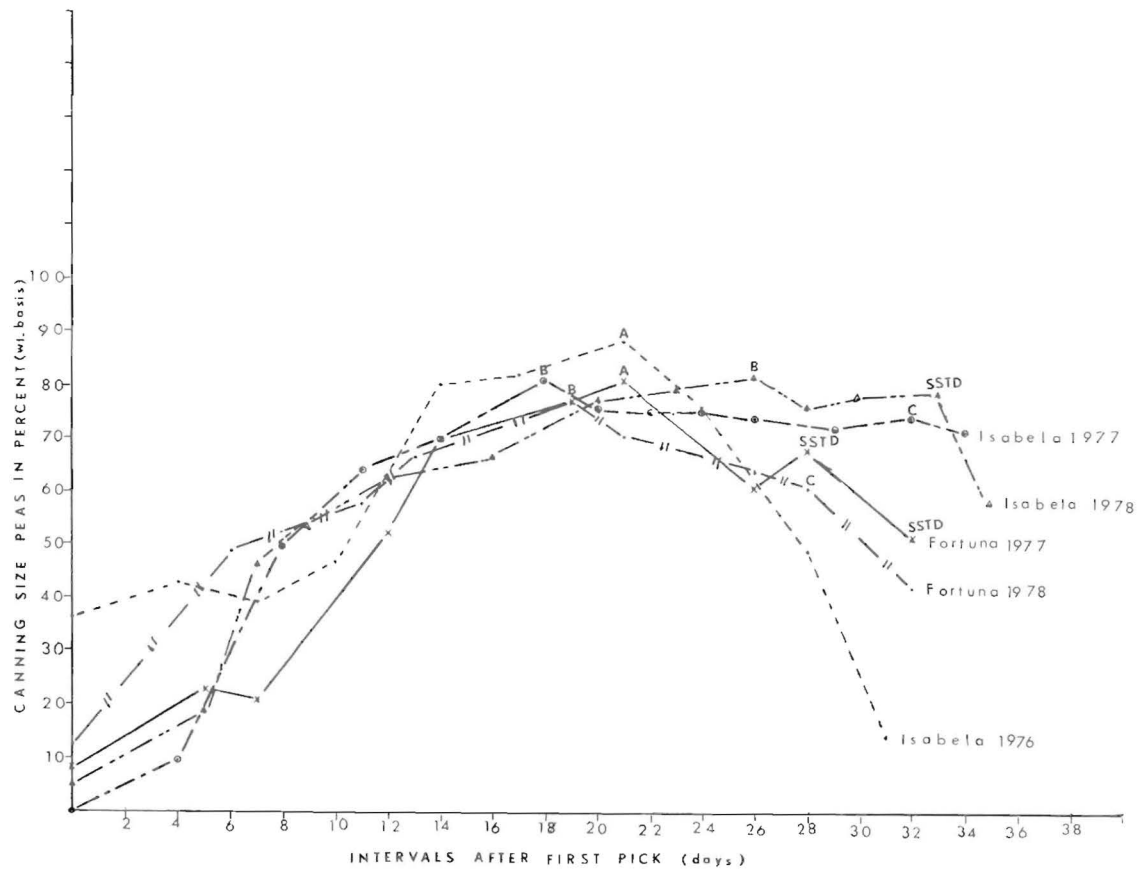


FIG. 1.—Maturity curves (weight basis). Symbols A, B, C and SSTD (substandard) indicate the canning grade of samples picked at the indicated day after first picking.

same pattern can be observed when canning-size peas on a count/count basis are plotted vs. time, the data in this case are more scattered and diffused, as seen in figure 2. Thus the percentage of canning size peas w/w is a better indicator of the stage of maturity of the plants than is the percentage on a count/count basis.

The commercial yield increases up to a maximum and then decreases as the plants mature. The commercial yield at any time can be estimated by multiplying the percentage of canning size peas by the total weight of peas produced. Table 2 presents the estimates of the maximum commercial yield of 15 plants and their grade, for each year and each region. The lowest yield, 476.12 grams/15 plants, corresponds to the 1977 season at

TABLE 2.—*Estimated maximum commercial production of 15 plants*

Year and Locality		Production	Grade	Days after first pick
G				
1976	Isabela	767.8	A	24
1977	Isabela	476.1	C	32
1977	Fortuna	932.9	SSTD	33
1978	Isabela	1434.4	SSTD	28
1978	Fortuna	1170.3	A	19

TABLE 3.—*Alcohol insoluble solids and canning grade at the peak of the curves and at end of the experiments*

Localities and Year		Peak of the curves		End of the experiments	
		Alcohol insoluble solids	Grade	Alcohol insoluble solids	Grade
		%		%	
Fortuna	1978	29.19	B	35.66	C
Fortuna	1977	27.05	A	39.94	SSTD
Isabela	1978	26.89	B	32.33	SSTD
Isabela	1977	21.12	B	30.58	C
Isabela	1976	27.24	A	43.98	—

Isabela. It came very late in the production stage of the planting, 32 days after the first picking; its canning grade C denotes that the quality had already passed its peak. In all other cases where the maximum commercial yield came the 24th day after the first sample was picked, the canning quality was C or substandard (SSTD). The maximum commercial yield does not necessarily coincide with the highest canning size yields of the curves; therefore for A or B canning quality, the harvesting date should be around the peak in the maturity curves.

Alcohol insoluble solids have been pointed out as one of the maturity indices for pigeon peas (5). At any given time, the alcohol insoluble solids value obtained represents the average for all the seeds included in the

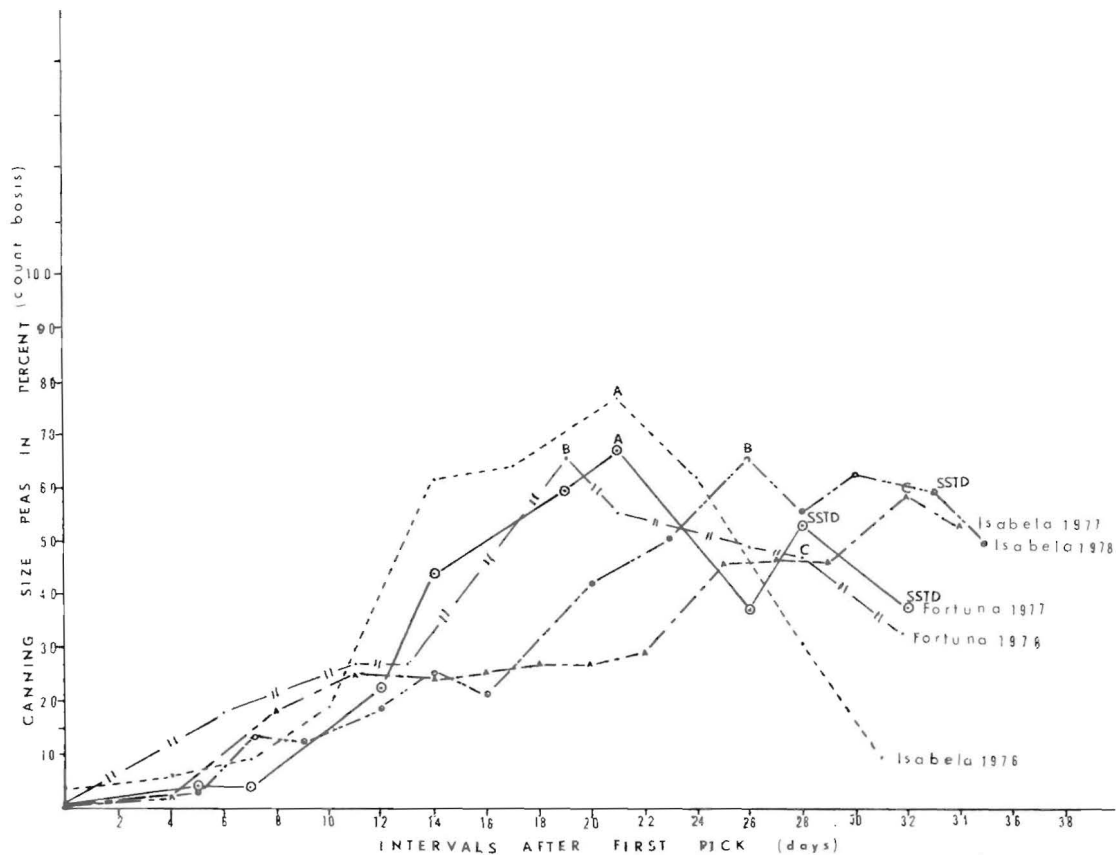


FIG. 2.—Maturity curves (count basis). Symbols A, B, C and SSTD (substandard) indicate the canning grade of samples picked at the indicated day after first picking.

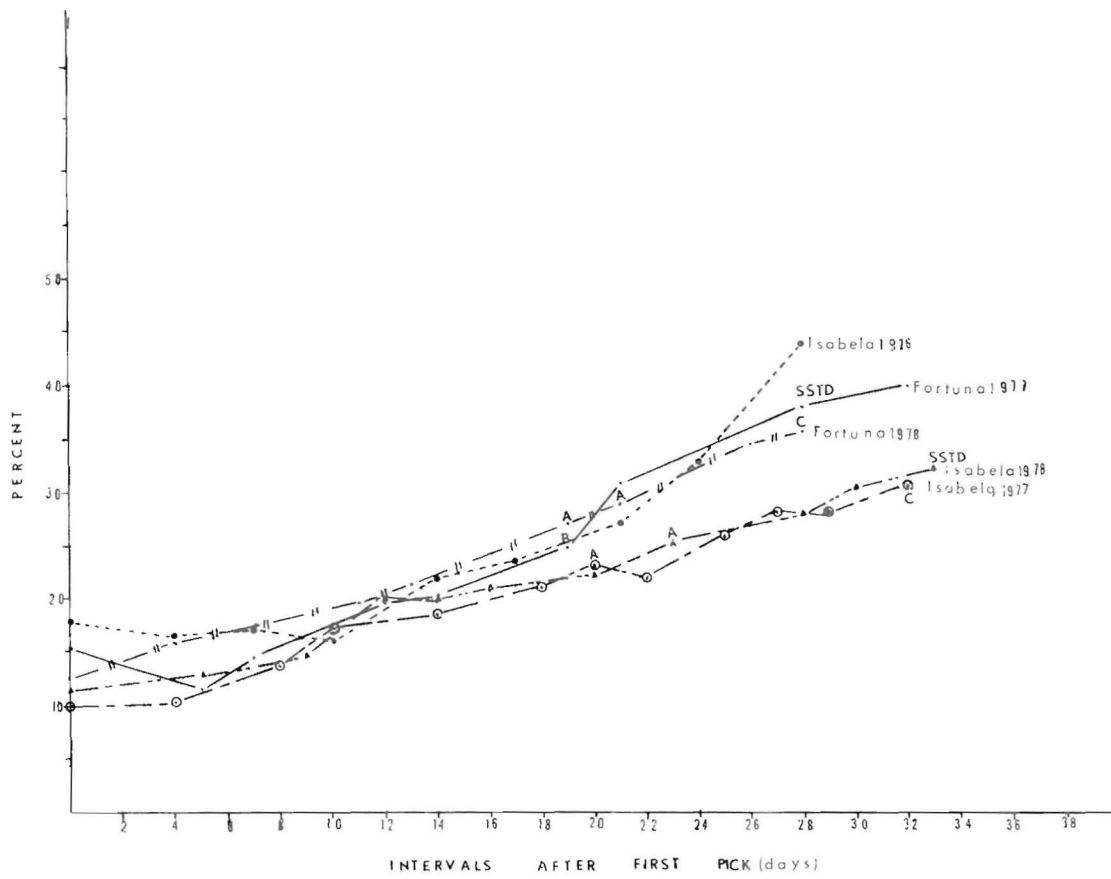


FIG. 3.—Alcohol insoluble solids. Symbols A, B, C and SSTD (substandard) indicate the canning grade of samples picked at the indicated day after first picking.

sample; at no time were all at the same stage of maturity, since flowers and pods do not come out at the same time. This is true even for 2B-Bushy which is considered a determinate line. Nevertheless, the alcohol insoluble solids increase as the peas mature, as shown in figure 3. At the lower values the peas were small, intense green and very tender; at the upper extreme the peas were yellow, big, tough and some were already dry. Table 3 presents alcohol insoluble solids and the canned grade associated with them at the peak of the maturity curves and at the end of the experiments. At the peak of the curves the canning grade was either A or B with the alcohol insoluble solids content ranging from 21.12 to 29.19%, while at the end of the experiments the canning grade was C or substandard (SSTD), with alcohol insoluble solids ranging from 30.58 to 43.98%. This finding suggests that beyond alcohol insoluble solids content of 30.0% only C or SSTD canned peas can be obtained.

RESUMEN

Se estudió el patrón de maduración del gandul cv. 2B-Bushy sembrado en las Subestaciones de Fortuna e Isabela. Se determinaron los rendimientos en términos de gandules del tamaño propio para enlatarse y la calidad de muestras enlatadas durante toda la etapa de producción de la plantación. Se muestran las curvas de maduración para cada experimento y de la calidad de las muestras enlatadas. Se presentan valores de sólidos insolubles en alcohol para dos estados de madurez y la calidad del producto cuando los gandules se enlatan en ambos estados de madurez.

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