

Research Note

TUMOR-LIKE FORMATIONS IN PAPAYA FRUIT IN PUERTO RICO

Papaya (*Carica papaya* L.), indigenous to tropical America, is a polygamous species with three primary sexual types: male, hermaphrodite and female.²

The 'Solo' type, originally from Barbados,³ was introduced in Hawaii and developed commercially there (fig. 1). This papaya currently has commercial importance in Puerto Rico, where it is grown both for the local fresh market and for export.⁴ Over 250 acres of this cultivar were planted in Puerto Rico in 1987.⁵

In 1963, Singh et al.³ reported that female Solo trees, although less productive than hermaphrodite trees, produced fewer malformed fruits.

In May 1988, tumor-like formations were observed inside otherwise normal-looking papayas. They occurred in cv. *Sunrise Solo*, on apparently healthy hermaphroditic trees (fig. 2). This finding led to a preliminary study which revealed evidence of malformations within the fruit of this cultivar.

An evaluation experiment on 'Sunrise Solo' papaya was conducted at the Isabela farm of the Tropical Agriculture Research Station (TARS) from 1987 to 1988. Seed was obtained from local growers. Plants were established and planted 2.44 m apart in rows 1.83 m apart. Each plant received a

15-15-15 commercial fertilizer at monthly intervals. It was side-dressed at the rate of 113.4 g/plant until flowering, and then at 226.8 g/plant. Overhead irrigation was provided as needed. Weeds were controlled with Paraquat.⁶

Fruit samples were collected at random in June 1988. Both hermaphrodite and female types were sampled, 36 fruits from each type. In addition, five fruits were taken from each of 20 hermaphroditic trees. Each fruit was sectioned and examined for tumor-like formations.

Results indicated that only the hermaphrodite plants produced fruits with tumor-like growths (table 1). The length of the tumors in ripe fruits ranged from 2.0 to 7.0 cm. Three to six tumors were observed in some fruits. The tumors varied in appearance (fig. 2). In one case a malformed and broken fruit from hermaphrodite plants (fig. 3) appeared with a tumor-like form emerging from the inside with chlorophyll covering its peel.

There were no apparent relationships between tumor formation and plant uniformity, vigor, fruit shape, and size. The structure and flavor of the tumor-like tissue did not differ from normal adjacent fruit tissue. The main objection to these formations would be their undesirable appearance,

¹ Manuscript submitted to Editorial Board 5 May 1989. The authors acknowledge Miguel Lugo-López and Niilo Virkki, AES-UPR, for their encouragement and critical reading of the manuscript.

² Story, W. B., 1953. Genetics of papaya. *J. Hered.* 94 (2): 70-8

³ Singh-Dhaliwal, T., A. Pérez-López and J. García, 1963. Performance of the Solo papaya (*Carica papaya* L.) in Puerto Rico. *J. Agric. Univ. P. R.* 47 (4): 246-51.

⁴ Anonymous, 1987. 1986 External Trade Statistics, Commonwealth of Puerto Rico. Puerto Rico Planning Board, San Juan, P. R.

⁵ Figueroa, W., 1988. Personal communication. Agric. Exp. Stn., Univ. P. R.

⁶ Colón-Guasp, W. and F. Vázquez, 1988. Performance of papaya cv. 'Sunrise' in Oxisol in Puerto Rico. Abst., XXIV Annu. Meet., Caribbean Food Crops Society in Jamaica, p. 11.

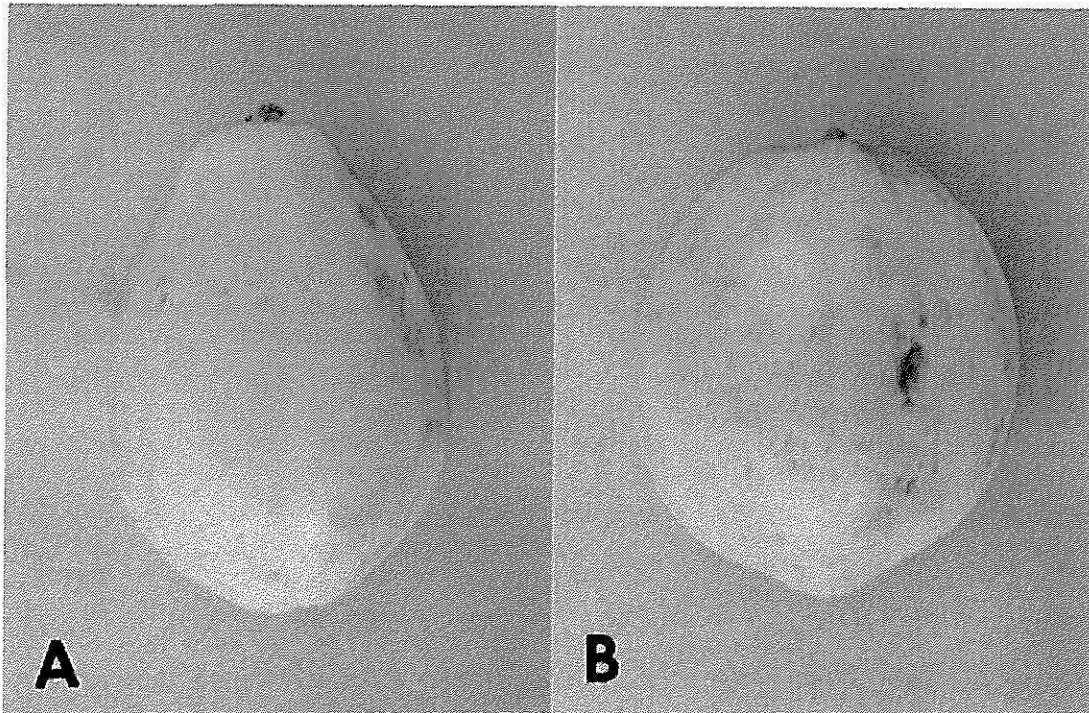


FIG. 1.—A. Normal-looking hermaphrodite; B. female papaya.

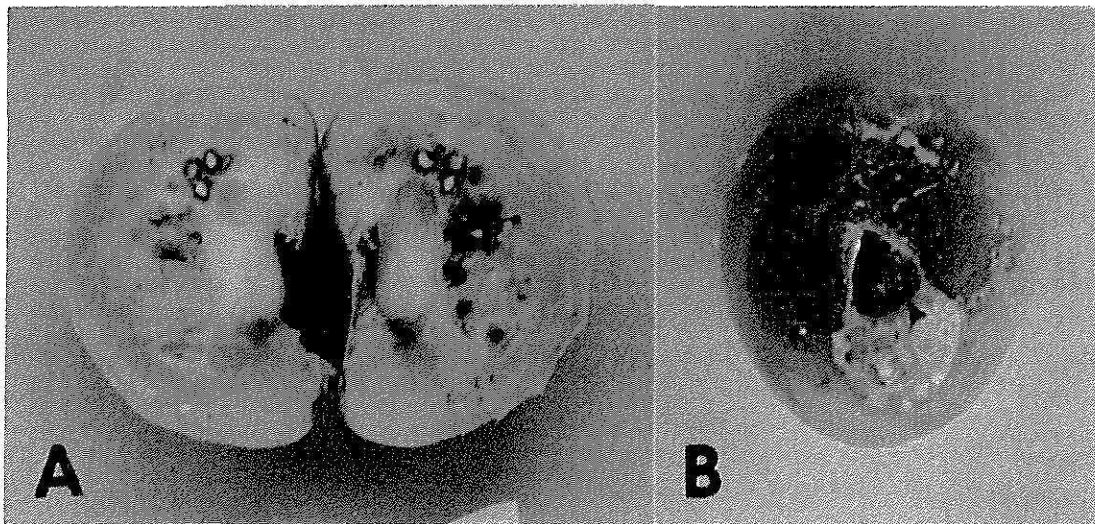


FIG. 3.—A. Malformed hermaphrodite papaya with a tumor-like growth emerging from inside fruit cavity. B. Outer tissues exposed to sunlight developed green color (arrow head).

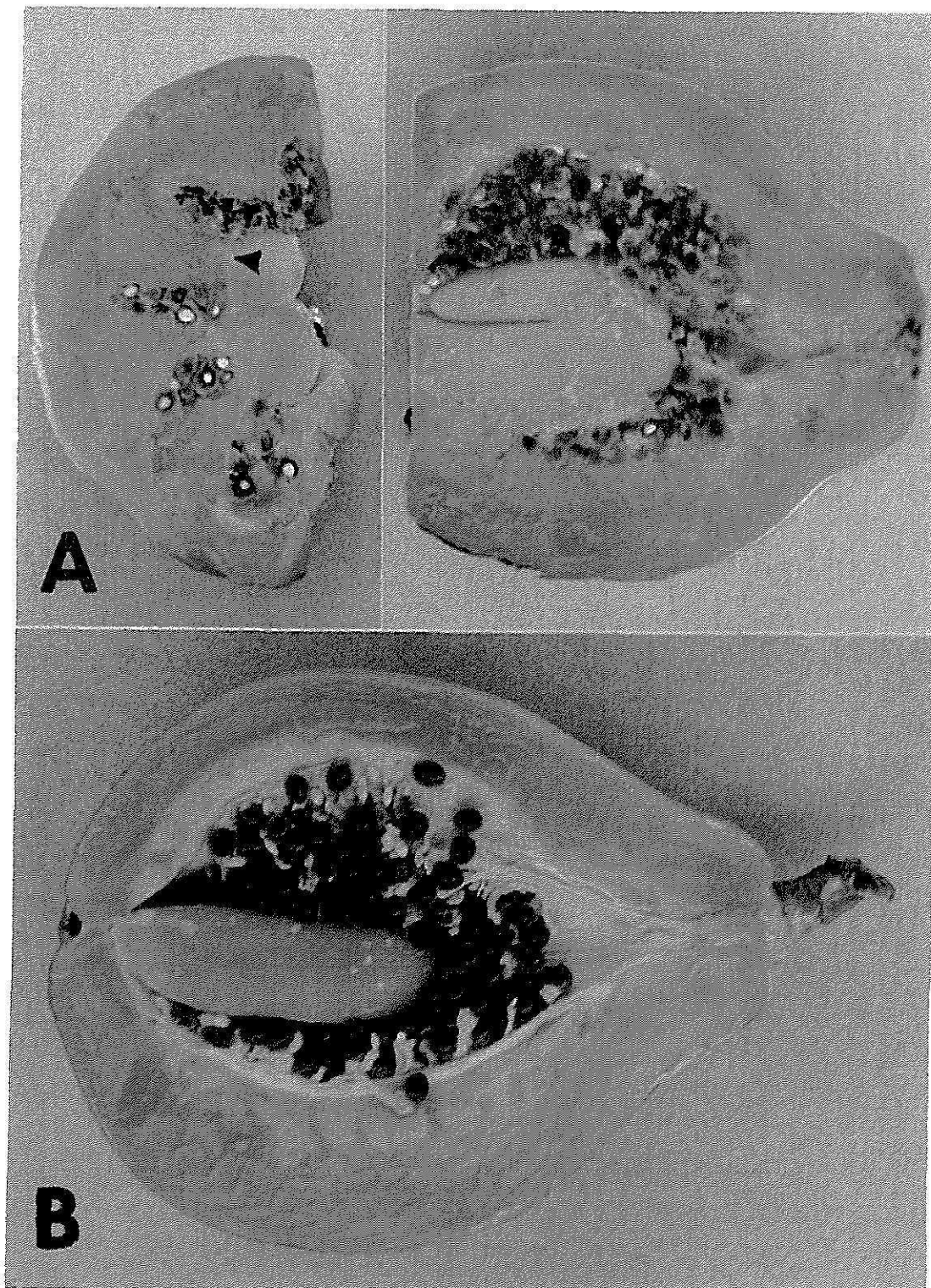


FIG. 2.—Hermaphrodite papaya fruit. Tumor-like growth arising from lateral (A); (B) apical part of fruit and both occupying part of the inner cavity.

TABLE 1.—*Evaluation of tumor-like growth in hermaphrodite papaya fruits¹*

Hermaphrodite trees ³	Fruit evaluation ²					
	0	1	2	3	4	5
12	+	—	—	—	—	—
5	—	+	—	—	—	—
2	—	—	+	—	—	—
1	—	—	—	—	—	+

¹ Five fruits were collected from 20 individually hermaphroditic trees.

² Number of fruits with tumor-like growths.

³ Number of affected trees.

which might have an adverse effect on the fresh market consumer, even more so than in the case of regular navel formations in some citrus fruits.⁷

There is scant reference in the literature to tumor-like growth of papaya fruit. In Florida⁸ such growths were observed in *C. papaya* cv. 'Cariflora.'

Evidence suggests that this condition is restricted to certain hermaphrodite trees.

Efforts should be directed toward selection of tumor-free plants for seed propagation in order to eliminate this presumably genetic disorder.

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⁷González, E. and C. Juan, 1960. El cultivo de los agríos. Instituto Nacional de Investigaciones Agronómicas, Madrid, España, 766 p.

⁸Campbell, C. W., 1988. Personal communication. TREC, Homestead, University of Florida.