

“Maipure,” A New Spineless Group of Pineapple Cultivars¹

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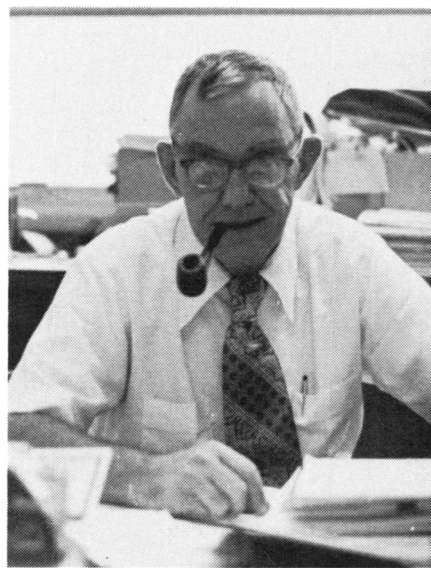
Adequate taxonomic or horticultural classifications of pineapple cultivars have not been devised. Hume and Miller's groups as modified by Py and Tisseau form a good basis but do not emphasize the value of the totally spineless cultivars. Another group, “Maipure,” is proposed at this time.

Pineapple [*Ananas comosus* (L.) Merr.] is the most important member of the predominantly epiphytic *Bromeliaceae*, of which all but a single species is native to the Americas. Pineapple has never been found in a truly wild state, like so many other major world crops, but several related species of *Ananas* and *Pseudananas* are indigenous to the dry uplands of the vast Mato Grosso region of Brazil, Paraguay and Bolivia (3, 4, 5). Indians cultivated the plant in Brazil, along the eastern and northern coasts of South America and on both the Atlantic and Pacific sides of Central America and throughout the West Indies centuries before Europeans came to the Western Hemisphere (3). Columbus was the first European explorer to see the plants and taste their delectable fruit when he anchored at Guadeloupe in 1493. Publications of Oviedo's *Historia General y Natural de las Indias* at Toledo in 1526 and Seville in 1535 (14, 15) brought pineapple to the notice of a wide audience in Europe. This great book, the first of several such on the plants, animals, and other features of the New World, contained drawings of the fruit (Fig. 1A), plant, descriptions of cultural practices, method of propagation and cultivars. Attempts were made to transport fruit from the West Indies to Spain but vegetative parts proved much more resistant to desiccation and would survive a protracted voyage (5, 16, 22). Spanish and, later, Portuguese explorers carried plants with them in their travels to the Far East. Indeed, pineapple was cultivated in Madagascar, southern India, Philippines (via China), Java and other countries by 1600 and had become so thoroughly at home there that the famous botanist Rumphius (19) thought the plant was native to the Malay Archipelago (7).

Pineapple was introduced to Spain



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in 1535 but its popularity throughout the rest of Europe did not really begin until greenhouses came into vogue in the 17th and 18th centuries (11). Then, it became a favorite fruit in royal and private gardens in France, England, Holland, Germany and even Russia (5, 7, 16). Thomas Johnson (9) said it is “a plant having leaves . . . somewhat sharp and prickly around the edges: the stalk is round, carrying at the top thereof one fruit of a yellowish colour when it is ripe, of the bigness of a Melon, covered with a scale-like rinde: the smell is gratefull, somewhat like that of the Malocotone [quince]: at the top of the fruit and sometimes below it come forth such buds . . ., which they set in the ground preserue [preserve] the kind by instead of seed: the meat of this fruit is sweet & very pleasant of taste, & yields good nourishment: there are certaine small fibres in the meat thereof, which though they do not offend the mouth, yet hurt they the gums of such as too frequently feed thereon.” (Fig. 1B). Many of the original

introductions disappeared as gardeners began producing cultivars through hybridization and selection of mutants. Hume's bibliography (7) contains 81 references dated prior to 1800, most of which were either botanical descriptions or accounts of cultural practices.

Munro's classification (12) appeared in 1835. He “separated the kinds reputed to be species which are readily known by their peculiar habits and distributed the varieties of *Ananassa sativa* [Lindley's name (10), with *Ananas Tournafort* given as a synonym], or the true pineapple, into classes and divisions.” The primary mode of division was different degrees of serrature along the leaf margins, including a smooth category, followed by flower color, and last, fruit form. The classification was entirely artificial but convenient at the time, although, as Hume and Miller (8) pointed out, the spacing between spines and their presence or absence depended upon the size and vigor of the leaf and growing conditions. About three-quarters of the cultivars in

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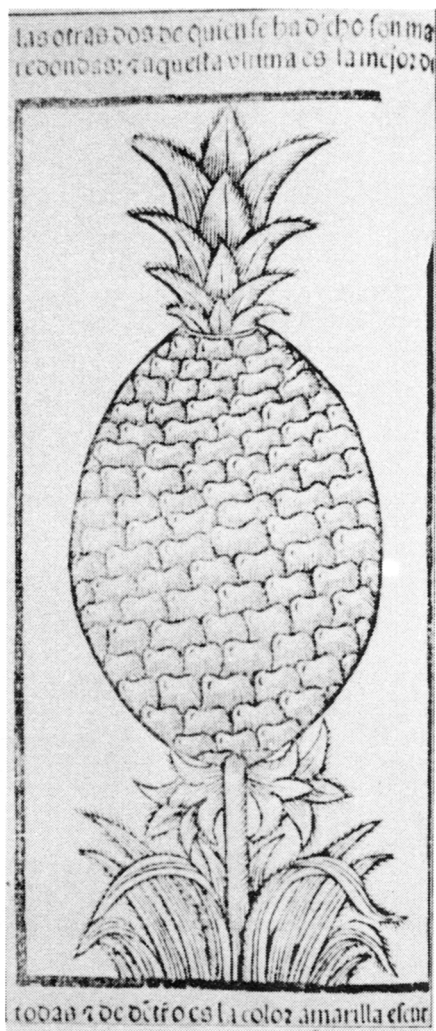


Fig. 1A. Pineapple from Oviedo's *Historia General y Natural de las Indias*, 1535, the first illustration of the plant ever published, (reproduced from Hume 1907) (14).

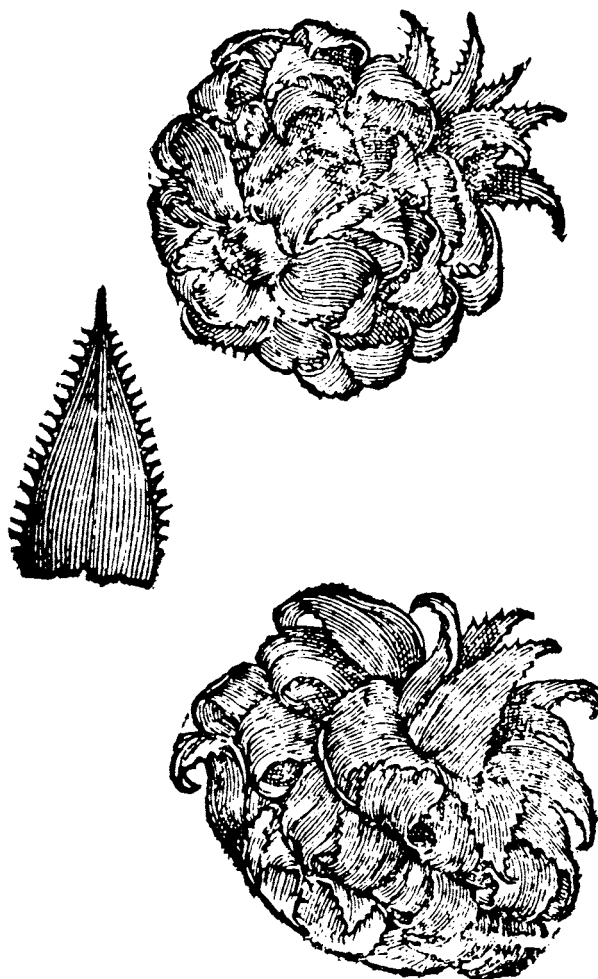


Fig. 1B. Pineapple crowns as depicted in Johnson's revision of Gerard(e)'s *Herball*, 1633, the first picture and description of the plant in English (9).

Munro's classification were named by Van Deman (23) in his account of Florida pineapple culture in 1888.

Hume and Miller (8) stated "no attempt has been made by any American writer to divide the pineapples cultivated in this country into groups as has been done with all other fruits." They separated the cultivars into "Queen", "Cayenne", and "Spanish" groups, with a miscellaneous category for a few others. They assigned 'Black Ripley', 'Egyptian' (Fig. 2), 'Golden' ('Golden Queen', Fig. 2), 'Green Ripley', 'Pernambuco' (Fig. 3), and 'Abachi' ('Abbakka', 'Abbachi', Fig. 3) to "Queen"; 'Cayenne' ('Smooth Cayenne', Fig. 4), 'Enville' (Fig. 4) and 'Rothchild' ('Charlotte Rothchild', Fig. 5) to "Cayenne"; and 'Blood' (Fig. 5), 'Porto Rico' (= 'Cabezona'), 'Prince Albert', 'Red Ceylon' (Fig. 6), 'Sugar Loaf' (Fig. 6), 'Spanish' ('Black Spanish', 'Scarlet Key Largo', 'Havanna', 'Cuban', 'Strawberry', = 'Red Spanish', Fig. 7), and 'Yellow Ceylon' (Fig. 7) to "Span-

ish." 'Wild Honduras', a small very fibrous seedy fruit was put in a miscellaneous category.

Bertoni (1) published a varietal classification in 1919 with such inadequate descriptions as to be useless for horticultural purposes. Camargo (2) separated cultivated pineapples according to spininess of the leaves and added 2 groups based on fruit characteristics in his classification of *Ananas comosus* in the *Bromeliaceae*. Group I, var. *sativus*, has leaves serrated along the entire margin, corresponding to Hume and Miller's "Spanish" category. Group II, var. *lucidus*, has leaves serrated along some portion of the margin, usually around the tip, equivalent to "Cayenne". Group III, var. *mordilonus*, has cultivars with completely spineless leaves. Group IV includes primitive forms with very acid but edible oblong fruit and Group V, wild forms with yellow, very acid fruit. The "Queen" group was excluded on the basis of its hybrid origin in British greenhouses. The classification is

not well known except in Brazil (See 18).

Collins and Kerns (6) investigated the inheritance of 3 leaf types, spiny, the typical form for cultivars in the "Queen" and "Spanish" groups, spiny-tip, the form in the "Cayenne" group, and piping (so named because of the peculiar folding over and fusion of the leaf margin tissue), the form for 'Monte Lirio' and other smooth-leaved cultivars. They ascertained that spiny-tip and spiny leaves were the phenotypic expression of a single pair of alleles, *S* and *s*, with spiny-tip dominant. Piping was controlled by another gene, *P*, which is epistatic to the *S* and *s* alleles. Spiny-leaved cultivars were *ppss* and 'Smooth Cayenne', *(pp)Ss*. The authors mentioned finding plants in Hawaii with spiny leaves in fields of 'Smooth Cayenne' and the much less common mutant reversion of spiny to smooth leaves among plants of a normally spiny cultivar. We have observed similar mutations in Puerto Rico and Venezuela (See

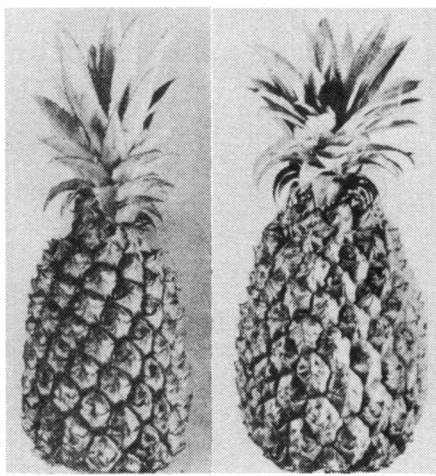


Fig. 2. 'Egyptian' (left) and 'Golden' ('Queen' group) pineapples in Florida. (Reproduced from Hume and Miller 1904).

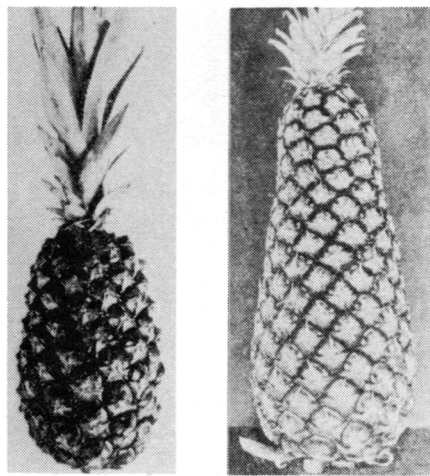


Fig. 3. 'Pernambuco' (left) and 'Abachi' ('Queen' group) pineapples in Florida, now classed in "Abacaxi" group (16). (Reproduced from Hume and Miller 1904.)

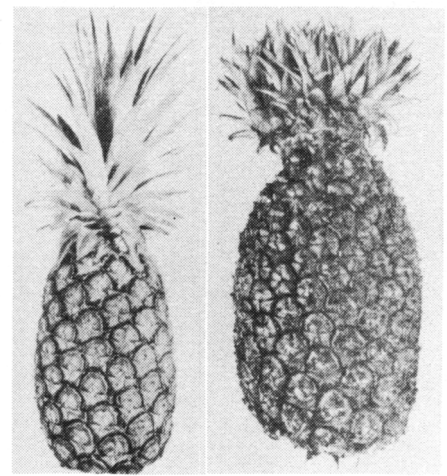


Fig. 4. 'Cayenne' (left) and 'Enville' ('Cayenne' group) pineapples in Florida. Note multiple crowns on 'Enville', now absolute. (Reproduced from Hume and Miller 1904.)

also 22).

Collins (5) retained Hume and Miller's groups, however, in his book, where only the most important cultivars were discussed. Py and Tisseau (16) subdivided Hume and Miller's "Queen" and "Spanish" groups into "Queen," "Spanish" and "Abacaxi." Samuels (20) stated in his review: "Pineapple varieties are often known by different names in different countries, often in the locality where they are grown, or from where they were introduced. There appears to be no adequate taxonomic or horticultural classification . . ." Samuels considered Hume and Miller's groups with Py and Tisseau's modification a good basis for evaluating the current status of pineapple cultivars. Principal characteristics of the 4 groups and their main

cultivars are summarized in Table 1. Examples of "Cayenne," "Spanish," and "Abacaxi" groups appear in Fig. 8 to 12. ("Queen" types are rare in the Western Hemisphere, so are not included.)

None of the current horticultural classifications includes a group for smooth-leaved forms, Camargo's var. *mordilonus*. There are several such cultivars in small commercial plantings in northern South America, Brazil and Central America. Py and Tisseau (16) put 'Amarella', 'Perolera' and 'Monte Lirio' in a section for "Some other well-known cultivars" at the end of their classification. Collins and Kerns (6) used 'Monte Lirio' in their work and mentioned 'Paulista' in Brazil. Van Deman (23) also listed some smooth-leaved forms of spiny varieties. The

name, "Maipure," proposed here for the smooth-leaved cultivars, memorializes the Indian tribe living around the famous rapids of the Orinoco River where these forms have been cultivated for centuries. Characteristics of the group and its main cultivars are summarized in Table 1, with an example of a whole and cut fruit in Fig. 13 and 14. These cultivars are of particular interest for the Western Hemisphere since they represent a gene pool of adapted forms hitherto scarcely utilized in breeding studies.

The present essentially seedless cultivars of pineapple were originally apparent mutations of seeded wild parents. Long continued vegetative propagation has perpetuated types which were and still are highly heterozy-

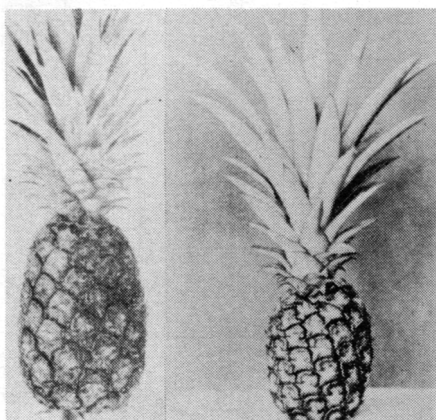


Fig. 5. 'Rothchild' ("Cayenne" group, left) and 'Blood' ("Spanish" group) pineapples in Florida, both obsolete. (Reproduced from Hume and Miller 1904.)

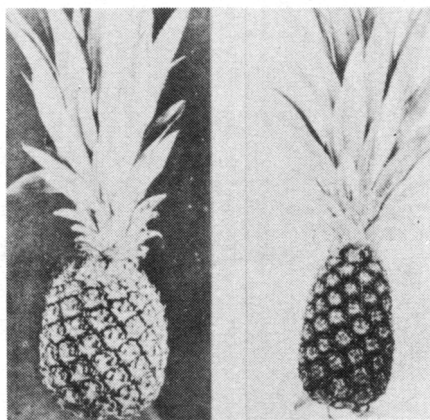


Fig. 6. 'Red Ceylon' (left) and 'Sugar Loaf' ("Spanish" group) pineapples in Florida; 'Red Ceylon' now obsolete and 'Sugar Loaf' assigned to "Abacaxi" group (16). (Reproduced from Hume and Miller 1904.)

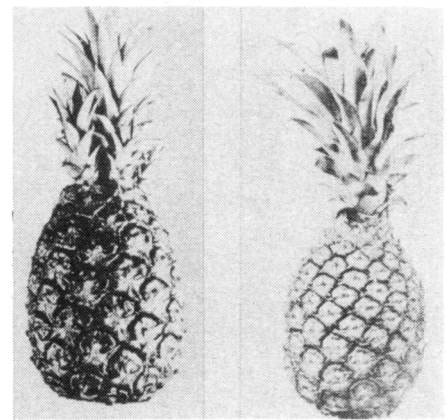


Fig. 7. 'Spanish' (left) and 'Yellow Ceylon' ("Spanish" group) pineapples in Florida; 'Yellow Ceylon' now obsolete. (Reproduced from Hume and Miller 1904.)

Table 1. Standard characteristics of pineapple groups and their principal cultivars.²

Characteristic	Group				
	Spanish ³	Queen ³	Abacaxi ³	Cayenne ³	Maipure
<i>Market</i>					
Canning	F	F	P	VG	F
Fresh fruit					
Local	G	G	G	G	G
Export	VG	G	F to P	F	F to P
<i>Leaves</i>	spiny	spiny	spiny	smooth, few spines near tip (spiny tip)	smooth (piping)
<i>Fruit</i>					
Weight (kg)	0.9–1.8	0.5–1.1	1.4	2.3	0.8–2.5
Shape	globose, lg. deep eyes	conical, deep eyes	conical	cylindrical, sl. taper, flat eyes	cylindrical-ovoid to cylindrical
Color					
Rind	deep O(R)	Y	Y	dark O	Y to dark O (Red)
Flesh	pale Y to W	deep Y	pale Y to W	pale Y to Y	W to deep Y
Core	large	small	small to very small	medium	small-medium
Taste	spicy-acid, fibrous	sweeter, less acid than "C.", low fiber	sweet, tender, juicy	sweet, mildly acid, low fiber, tender, juicy	sweeter than "C.", fibrous, tender, v. juicy
<i>Disease problems</i>	gummosis, wilt resistant	more resistant than "C."	resistant	mealybug wilt	unknown
<i>Cultivars⁴</i>	P.R., Cuba, Mexico, Central America: 'Red Spanish' Malaysia: 'Singapore Spanish', 'Green Selangor' San Salvador: 'Castilla' Puerto Rico: 'P.R. 1-67', 'Cabezona'	S. Africa: 'Queen', 'MacGregor', 'Z' ('James') Australia: 'Natal', 'Ripley', 'Alexandria'	Brazil, Ivory Coast: 'Abacaxi' Florida: 'Abakka' Eleuthera P.R., Cuba, S. & Cent. America: 'Sugar Loaf' Venezuela: 'Papelon', 'Venezolana' Brazil (minor): 'Ananas Vermelho', 'Amarella'	Worldwide: 'Smooth Cayenne' Guadeloupe: 'Cayenne Guadeloupe' Martinique: 'Cayenne Martinique' Guinea: 'Cayenne Lisse', 'Baron Rothschild' Guatemala: 'Smooth Guatemalan' Taiwan: 'Typhone' Azores: 'St. Michael' Mexico: 'Esmeralda'	Venezuela, Colombia: 'Maipure', 'Bumanguesa' Colombia, Peru: 'Piamba de Marquita' Brazil: 'Abacaxi Rondon' Colombia, Venezuela: 'Perolera', 'Lebrija' Cent. America: 'Monte Lirio'

²Abbreviations: VG = very good, G = good, F = Fair, P = poor, Y = yellow, O = Orange, W = White (actually very light yellow or cream color), "C." = "Cayenne" (group).

³Information from (20).

⁴Remarks: Spanish: 'P.R. 1-7' 2.6 kg average weight, sweeter and less fibrous than "Red Spanish"; 'Cabezona' triploid, 5.5-6.8 kg, nearly obsolete.

Queen: 'Z' ('James') tetraploid.

Abacaxi: Cultivars best suited for local use.

Cayenne: Many mixtures except in Hawaii; sometimes few slips.

Maipure: 'Monte Lirio' now being exported to Europe.

gous in genetic constitution. Pineapple cultivars not only exhibit frequent spontaneous mutations in virtually all of their characteristics, but they are also self-sterile (self-incompatible) to a high degree (5, 16, 22). The first necessitates continual rigorous selection and roguing of plant material if the identity of a given cultivar is to be maintained.

Shamel (21) recommended such a procedure over 50 years ago to growers in Hawaii and it was adopted soon thereafter. Selection and roguing are obvious, although often laborious, means of eliminating undesirable mutants, such as multiple crowns, collar of slips, basal knobs, and other aberrations (5, 16, 22). On the other hand, desirable mutants

appear occasionally and are often the most feasible means for obtaining superior strains of existing cultivars (5, 22). Self-sterility, and consequent parthenocarpic fruit set, is an immense advantage, since seeds are rarely produced in fruit of a given cultivar (22) even when natural pollinators, such as hummingbirds and insects, mainly



Fig. 8. A 'Smooth Cayenne' pineapple field at Kimpese, Zaire. (Photo courtesy of Eric MacKenzie.)



Fig. 9. A field of young 'Esmeralda' ("Cayenne" group) pineapple plants spaced 90 x 60 x 90 cm, Loma Bonita, Mexico. (Photo courtesy of Eric MacKenzie.)

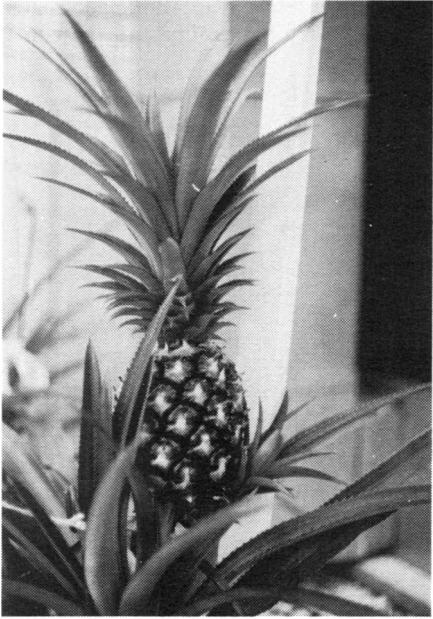


Fig. 10. Half-grown 'Red Spanish' fruit in 12-liter can outside Fruit Crops Dept. plastic house, University of Florida, Gainesville.

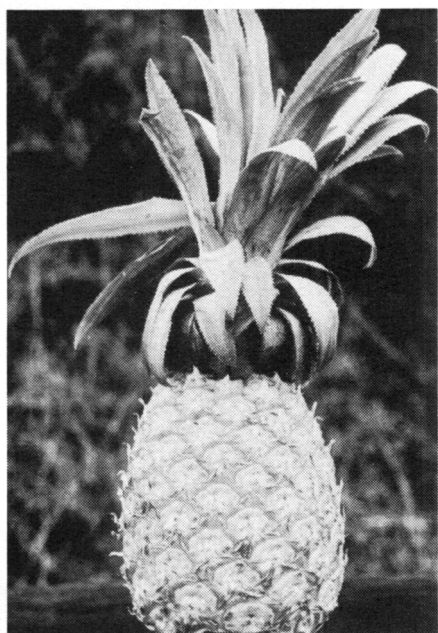


Fig. 11. Ripe 'Valera Amarilla' ("Spanish" group) fruit in Venezuela.

moths, are present (5). Pineapple cultivars are cross-compatible, insofar as is known, hence hybrids are readily produced by cross-pollination, either natural, as in the case of 'Puerto Rico 1-67' (17), or artificial (5, 22). Natural polyploids are known: 'Cabezona' is a triploid (5) and 'James Queen', formerly 'Z Queen' is a tetraploid (13). Attempts

to obtain commercially acceptable triploid or tetraploid cultivars through hand-pollination have, however, been generally unsuccessful (5). Production of new mutant and hybrid forms will necessitate periodic revision of the current classification of the 5 groups of pineapple cultivars, particularly in those instances where intergroup hybrids do not clearly fit into the group of either parent or it becomes apparent that spiny and smooth subclasses should be established for the 3 present spiny-leaved groups.

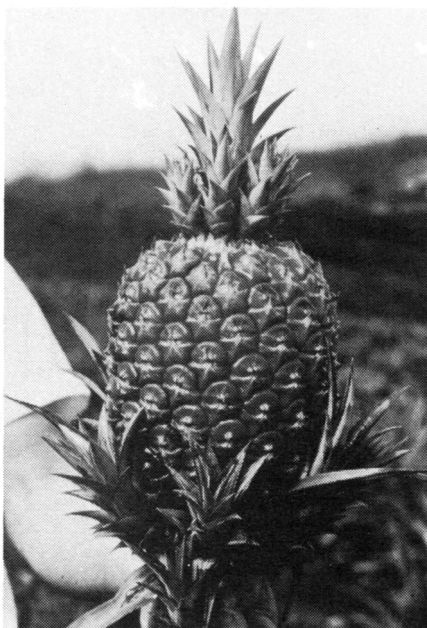


Fig. 13. Ripe 'Bumanguesa' ("Manipure" group) fruit in Venezuela. The color is bright red at full maturity. Note the nearly cylindrical shape with small flat eyes and square ends; the crown slips above and "collar of slips" below the fruit are undesirable characteristics which can be eliminated through proper selection and roguing of plant material.

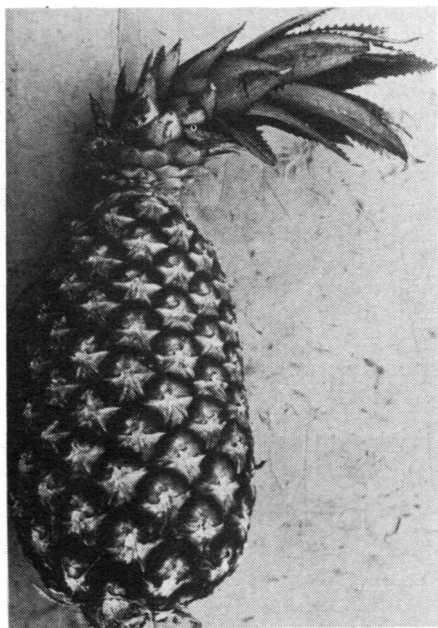


Fig. 12. Ripe 'Papelón' ("Abacaxi" group) fruit in Venezuela. Note the fruit is well formed despite the peduncle having been toppled over at an early stage of fruit development.

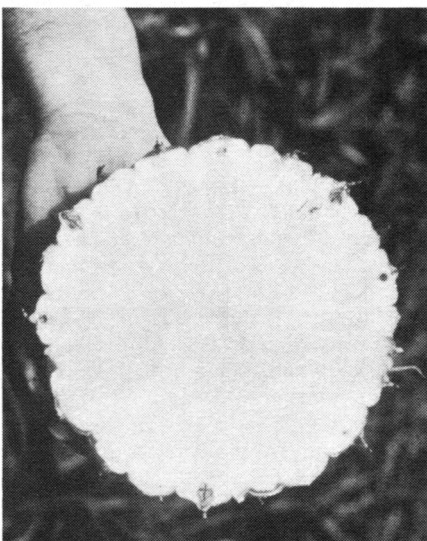


Fig. 14. Cross-section of a ripe 'Bumanguesa' fruit with shallow eyes, juicy yellow flesh and small core.

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