tive ofttimes being loaded down with from 40 to 60, or more, pounds of fruit. About 7 months are required from planting to first harvest. Ripening may then continue for several months.

"Upon reaching maturity, cocona fruits turn from the earlier bright-yellow to deep-red or burnt-orange color and are then most attractive. At this stage the peachlike fuzz which is typical of this tribe of edible large-berried fruits of the genus *Solanum* is easily brushed off, leaving a clear and blemish-free skin.

"The flesh and inner pulp is of a pale-cream color throughout, a fact which readily distinguishes this fruit from its two nearest relatives, the naranjilla and lulita, the pulp of which is a translucent green color.

"Although the flavor of uncooked coconas is agreeable, the pulp is distinctly acid, and they are not recommended for eating out of hand. When peeled as an apple and used entire for making preserves, pies, and sauces, the product might be compared with that of apricot, pineapple, or gooseberry."

The cocona plant grows to a height of 4-5 feet and should be planted 5-6 feet apart in the field.

Planted this year for the first time at the Botany Department of the University of Miami, the plant has shown some expectations for the future.

The fruit set was definitely not abundant, but seed is available in small quantities to try out the plant in some other parts of the State of Florida with a little more distinct difference in day and night temperature as in Miami during the summer.

The cocona is susceptible to nematodes, which is particularly the case in alkaline soils.

OBSERVATIONS OF FLORAL BIOLOGY AND FRUIT-SETTING IN LYCHEE VARIETIES

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The lychee, *Litchi chinensis* Sonn; is a native of South China where it has been cultivated for centuries. It is a comparatively recent introduction in Florida, having fruited for the first time in this area in 1883(2). Although cultivated on a relatively small scale in Florida, it is rapidly gaining popularity as a luxury fruit.

A search through the available literature on the lychee reveals considerable information dealing with the cultivation and utilization of this fruit but little information regarding its floral biology other than that presented by Khan (3) and Groff and Liu (1).

Investigators at the University of Michigan and at the University of Miami recognized the need for this information and unknown to each other undertook similar investigations. When the situation became known to those doing the research work, it was decided to combine the findings into a single paper. The observations by Liu were made on trees grown in the late Col. Wm. R. Grove's Lychee Orchards in Laurel, Florida and those by Mustard and Nelson on trees located in Dade County. Although this collaboration has resulted in some duplication of data, it is felt that such duplication is warranted as it shows that the observations made hold true under somewhat different cultural and climatic conditions.

FLOWER TYPES

The individual flowers of the lychee are born in profusion in panicles (Fig. 1). Observations made at Laurel show that the lateral and terminal panicles vary considerably in size (Table 1). The terminal inflorescenses on one tree of the Brewster variety were found to average 45.7 cm. in length by 40.6 cm. in width, but in the Sweet Cliff variety the dimensions were 16.5 by 17.7 cm. The average length of

[1]/The information presented here by Su-Ying Liu is a portion of the material which she has prepared as a Doctoral dissertation at the University of Michigan. The dissertation will be published elsewhere in its entirety at a future date.

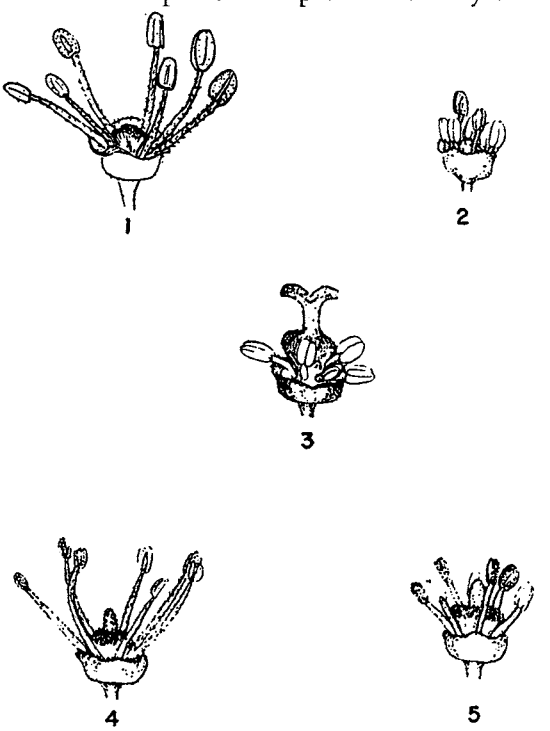
Fig. 1. Lychee Panicle.

lateral panicles in Brewster, Kwei Wei, and Sweet Cliff varieties shows remarkable differences. Brewster and Kwei Wei both have lateral panicles 25.4 to 27.9 cm. long and the Sweet Cliff variety ranges from 5.0 to 17.7 cm. In Late Globe variety, only short panicles were found averaging about 16.5 cm. in length. Liu found by counting the individual flower that the longer the panicle the more flower buds were produced.

The relatively small and inconspicuous flowers are yellow-green in color, pubescent and apetalous. The stamens and pistils are inserted into the nectary located within the cup-shaped calyx. The observations of individual flowers made in Laurel and in Dade County show that the lychee flowers differ considerably with regard to stamen and pistil development. Liu divides these flowers into three groups which she classifies as staminate, functionally pistillate and imperfectly hermaphrodite; whereas, Mustard and Nelson classify them as staminate, hermaphrodite functioning as female and hermaphrodite functioning as male. Despite the differences in terminology, the accompanying descriptions and plates clearly show that the same three basic types of flowers were observed in both localities.

Observations in Dade County

1. Male or staminate flowers (Plate I, Fig. 1 and 2). These flowers are easily distinguished from the hermaphrodite flowers by the absence of a pistil. The position normally occupied by the latter structure contains a conspicuous pink, pubescent protuberance. This protuberance is a very rudimentary or aborted form of pistil lacking both stigma and style. The filaments in this type of flower vary in length. In some flowers the filaments are from two to three times the length of the two-celled anthers. In others they are about equal in length to the anthers. At the time the latter type was observed, the anthers were shedding pollen and therefore should have completed their growth.



EXPLANATION OF PLATE I

Flowers of lychee.

Fig. 1. Staminate flower with long filaments.
Fig. 2. Staminate flower with short filaments.
Fig. 3. Hermaphrodite flower functioning as female.
Fig. 4. Hermaphrodite flower functioning as male with long filaments.
Fig. 5. Hermaphrodite flower functioning as male with short filaments.

2. Hermaphrodite functioning as female (Plate 1, Fig. 3). This type of flower strongly

TABLE 1. Data Regarding Duration of Flowering, Numerical Distribution of Sex Types, and Sizes of Inflorescence and Flower Types in Lychee Varieties*

Sample No.	Variety	Plot and Tree No. in Lychee Orchard	No. of Panicles Observed	Date of Blooming Season	Total Days in Consecutive Bloom	Order of Bloom and Av. No. of Days (Cycle I) ♂	♀	☿	Blooming Cycle Repeated (II)	Av. Length and Width of Terminal Inflorescence (cm.)	Av. Length of Lateral Panicles (cm.)	Av. Length of Rachis (cm.)	Av. Total No. of Flowers Per Panicle	Av. % of Unisexual and Bisexual flowers Per Panicle ♂	♀	☿	Av. Size of Different Sex of Flowers (mm)	Over-lapping Days	Inter-mission Days
1	Brewster Chen Family Purple 陳家紫	II-5b	9	Mar.1 – Apr.12	40 – 45	20	9	13		45.7 x 40.6	24.3	5.0 – 7.6	740	64.5	9.0	26.5	10-12 x 6-7 7 x 3-3.5 7 x 2.5-3	2	
2	Brewster	M-9	7	Mar.10 – Apr.19	37 – 41	17	5	15		25.4 x 17.7	17.7	2.5 – 5.0	319	47.6	16.3	36.0			1-3
3	Brewster	H-1	8	Mar.11 – Apr.17	38 – 40	11	8	20	(II)	40.6 x 17.7	20.3	1.3 – 5.1	320	28.7	16.6	54.7	9.0 x 7-8 7 x 3-4 8-9 x 5-6	2	1
4**	Brewster	I-1	6	Mar.9 – Apr.19	42 – 45	♀ 7	☿ 11	♂ 22	(II) ♀ 12 ☿ 6	29.1 x 30.4	22.8	3.8 – 5.0	436	7.8	10.6	81.6	12 x 5-7 10-11 x 4 9-10 x 4	2-7	
5	Brewster	L-9	9	Mar.13 – Apr.21	37 – 42	12	6	19		38.1 x 33.0	22.8	3.8 – 7.6	461	30.8	20.0	49.2			2
6	Brewster	L-8	6	Mar.14 – Apr.21	39 – 41	10	5	19	(II)	38.1 x 35.5	25.4	3.8 – 5.0	642	15.6	15.1	69.3	9 x 4.5 8.5 x 4.5 8 x 5		2
7	Brewster	K-6	6	Mar.14 – Apr.19	37 – 40	11	6	20		38.1 x 20.3	17.7	2.5 – 3.8	401	25.7	13.2	60.9	9 x 5 8.5 x 4.5 7.5 x 5	1	
8	Kuei Wei Kwai Mi 桂味	II-3a	4	Mar.8 – Apr.11	35 – 40	17	7	10		40.6 x 27.9	27.9	7.6	1051	54.2	16.1	29.7	12 x 6 8 x 4 8 x 4		
9**	Mountain Lychee 山枝	III	4	Mar.25 – May 5	40 – 46	♀ 10	☿ 18	♂ 9	(II) ♀ 7 ☿ 2	30.4 x 27.9	25.4	2.5 – 3.8	284	10.6	67.2	22.1	11 x 6 8 x 6.5 10 x 4	2-3	
10	Mountain Lychee	Z-4	2	Mar.24 – Apr.23	31 – 34	4	10	16		20.3 x 12.7	16.5	2.5 – 3.8	577	3.5	17.3	79.2	10 x 4 10 x 6 8 x 7		1
11	Yellow Red	Q-1	2	Mar.15 – Apr.21	38 – 43	6	11	26	(II)	17.7 x 11.4	15.2	1.9	525	4.2	13.7	82.0	7-9 x 3 11 x 4 8.5-10 x 4	2-5	
12	Late Globe	P-5	3	Mar.26 – Apr.29	33 – 36	10	9	14		18.9 x 15.2	16.5	2.5	330	13.6	18.0	68.5	9-11 x 6 10 x 5 8-10 x 7	2	2
13	Sweet Cliff 甜岩	N-5	16	Mar.15 – Apr.17	34 – 38	15	8	11		16.5 x 17.7	5-17.7	0.32 – 1.27	182	53.0	16.4	30.7	10.5 x 4 8 x 4 8 x 5		
14	Black Leaf Hak-ip 黑葉	E-2	3	Mar.19 – Apr.24	35 – 40	7	8	20	(II)	35.5 x 15.2	25.4	1.3 – 4.5	878	2.5	19.2	78.1	9 x 6 11 x 6-8 11 x 6-8		

* 14 trees were selected, of which the same 85 panicles were observed every day during flowering.

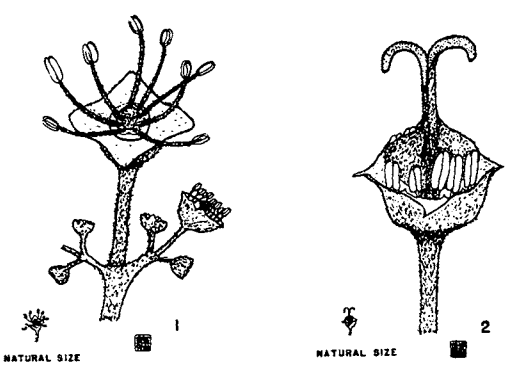
** Tree grown from seedling.

resembles the hermaphrodite flower functioning as a male with short filaments except that the lobes of the stigma open down the vertical cleft exposing the surfaces of the stigma to pollen. None of the anthers observed on this type of flower dehisced and may therefore be considered as non-functioning.

3. Hermaphrodite flower functioning as a male (Plate 1, Fig. 4 and 5). Both pistil and stamens are present in these flowers but the pistil is non-functional as the lobes of the stigma do not open to permit the entrance of pollen. The filaments of these flowers also vary considerably in length. The filaments of one group of flowers are approximately equal in length to those of male flowers with long filaments whereas the filaments of the other group are like the male flowers with short filaments previously described. Both produced abundant pollen.

Observations at Laurel

1. Staminate flowers (Plate II, Fig. 1) usually opening before pistillate ones, provided with a minute, pubescent, depressed-conical rudimentary pistil at center. Stamens 5 to 10, usually 7 or 8, widely diverging; filaments free, subulate-filiform, hairy. Another 2-celled, elliptical, pappillose, emarginate at apex, introse, basically fixed, longitudinally dehiscent. Pollen grains small, triangular, rarely quadrangular, having angles nipple-like with three germinal pores.

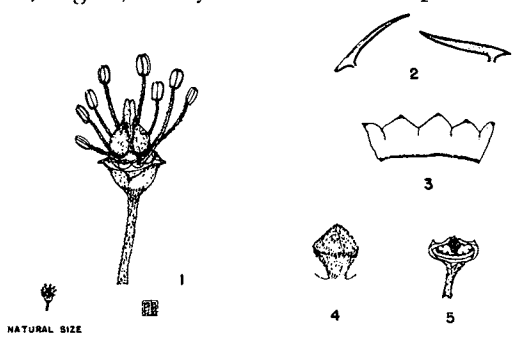


EXPLANATION OF PLATE II

Flower of Litchi chinensis Sonn. var. cult. "Brewster."
Fig. 1. Habit of portion of staminate cyme. X10
Fig. 2. A pistillate flower. X10

2. Pistillate flowers (Plate II, Fig. 2), often with 5 to 8 contabescent stamens. Pistil one, bicarpellate, in the middle of the disc. Ovary superior, compound, obcordate, short-stipitate, 2-lobed, 2-loculed, densely appressed-pubescent, at length tuberculate, hairs short; lobes soon divaricate and prolonged but the fertile ones quickly enlarging and later erect, the other one abortive. Style erect between ovary lobes, terminal, bifid; with revolute stigmatic branches, minutely hirsute outside and papillose inside. Ovules solitary in locules, anatropous.

3. Imperfectly hermaphroditic flowers (Plate III, Fig. 1) always bloom after the pistillate flowers. Although such a flower possesses both male and female organs, the structures are quite different from other types. Stamens in two sets of unequal length, only those with long filaments being fertile. Pistil one, with short undivided style and stigmatic suture not opening to form two stigmatic branches and non-functional as a result. Pollen grains of two forms, some triangular and some rectangular in outline.



EXPLANATION OF PLATE III

Flower of Litchi chinensis Sonn.

Fig. 1. A functionally dimorphic-staminate (but structurally imperfectly hermaphroditic) flower. X10
Fig. 2. Simple unicellular, unequally two-armed trichomes from flower, showing short stalk. X250
Fig. 3. Calyx of the flower, 4- or 5-parted, displayed and much enlarged.
Fig. 4. A pubescent and depressed-conical rudimentary pistil from staminate flower. X10
Fig. 5. A staminate flower with all stamens removed to show the glandular, fleshy disc and receptacle. X7

Flowering Cycle

It has been found that the three types of flowers previously described appear consecutively on the same panicle. Khan (3), working in India, describes their order of appearance in five stages: male cycle; first transition stage, when both male and female flowers are present; female cycle; second transition stage, when both female and male flowers are present; and second male cycle.

Since this portion of the investigation in Dade county was undertaken to determine the availability of pollen for fertilization, no attempt was made to distinguish between the staminate and the hermaphrodite flowers functioning as males. Both types of flowers are recorded simply as male flowers in these data. A total of 43 panicles were tagged on twelve Brewster lychee trees at the University Experimental Farm and checked every three to four days to determine the types of flowers present. In addition, 68 panicles were tagged on 14 other lychee trees scattered through Dade County. Flowers of the latter trees were checked at weekly intervals. It was found that the appearance of flowers followed the same general sequence on all panicles examined. The flowers which opened first were *males; those* which opened next were females; and those which opened last were males. It can be seen from the data in Table 2, that the shift from one type of flower to the other occurs as a gradual transition rather than as a sharp demarcation and that all panicles on a tree are not necessarily at the same stage in the floral cycle at the same time. The situation should be beneficial to pollination.

Liu's observations of the flowering cycle of lychees in Laurel, Fla. followed the same general pattern as that of those in Dade County. Her data is based on observations made of 85 panicles on 14 lychee trees including representatives of the Brewster, Kwei Wei, Mountain, Yellow Red, Late Globe, Sweet Cliff, and Hak-ip varieties. Observations were recorded daily during the flowering period. Liu found that each panicle or flowering branch bears either staminate or pistillate flowers at one time, the branch becoming staminate and pistillate alternately. All the small lateral branches of a main thick branch behave similarly, i.e., all of them at the same time have flowers of the same sex for a brief period, except during the overlapping days when there are two types of flowers on the same branch.

As can be seen from Liu's data in Table 1, the order of flowering is staminate flowers first, then pistillate flowers, and finally imperfectly hermaphroditic ones. After the first blooming, the second sequence begins sometimes repeating the order of the first sequence again. Usually, however, the first phase is skipped, only the pistillate and the imperfectly bisexual flowers repeating the second sequence. There is always either an overlapping or an intermission of one to three days after the first cycle or sequence. There are exceptions in the seedling trees. They all begin so far as observed with pistillate flowers, which are followed by imperfectly hermaphroditic flowers, and staminate flowers end the first sequence. The second sequence repeats the pistillate, and imperfectly hermaphroditic flowers and finally the staminate flowers are skipped. Not all the trees observed possessed this characteristic of repeating or partially repeating the flowering sequence. Liu found that staminate flowers are produced for a longer period than pistillate flowers in the blooming sequence of the Brewster variety in which they continue to be produced for 10 to 20 days. In the Hak-ip and Yellow Red varieties, staminate flowers are in bloom for approximately a week. The function of the male flower is over after the anthers burst and liberate their pollen. The pistillate flowers which follow next in sequence are usually produced for a shorter time than the staminate flowers. The former are produced for from 5 to 9 days in the Brewster, Late Globe, Sweet Cliff, and Hak-ip varieties. The last to bloom in the first sequence, the imperfectly hermaphrodite flowers, frequently are produced for a longer period than the other two types.

Pollen

Liu's investigation includes a study of the anatomical differences in pollen produced by staminate and imperfectly hermaphrodite flowers. The details of this phase of her research will be published elsewhere at a future date.

Viability of Pollen

The procedure followed by Mustard and Nelson in determining the viability of the pollen from the three types of flowers described above is as follows. Hanging drop slides were prepared by placing a few grains of pollen to be tested on a cover slip and adding a drop of nutrient solution to the pollen. A small amount of vaseline was smeared around the edge of the concavity of a hanging drop slide and the cover slip then inverted over the concavity. The slides were placed in a dessicator containing 50% glycerine and water and stored at 20° C. Preliminary tests were run using sucrose solutions ranging from 3 to 30% with and without the addition of "Bacto" agar to determine the concentration best suited for

Table 2. Stages in the Flowering Cycle of Brewster Lychees in Dade County.

Date	Tree #1 Panicles				Tree #2 Panicles				Tree #3 Panicles				Tree #4 Panicles				Tree #5 Panicles				Tree #6 Panicles			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
3/4/53	M	M	M	M	M	M	M	M	M	F	F	F	M	M	M	M	O	M	M	O	F			
3/9/53	M	F	M	F	M	M	M	M	SF	F	SM	SF	F	F	F	F	M	M	F	M	SF			
3/11/53	F	F	F	F	M	M	M	M	SM	SM	SM	SM	F	F	F	F	M	M	F	F	SF			
3/13/53	F	MFS	F	F	M	M	M	M	SM	SM	SM	SM	F	F	F	F	M	M	SF	F	SF			
3/16/53	SM	SM	SM	SM	MF	F	F	MF	SM	SM	SM	S	SM	SM	SM	SM	F	F	SM	SM	S			
3/18/53	SM	SM	SM	SM	F	S	S	F	SM	SM	SM	S	SM	SM	SM	SM	S	SM	SM	SM	SF			
3/20/53	SM	SM	SM	SM	SF	SM	SF	S	S	S	S	S	SM	SM	SM	S	SM	SM	SM	SM	SF			
3/23/53	SM	S	SM	SM	SM	SM	SM	SM					S	SM	SM		SM	SM	SM	SM	S			
3/25/53	S	S	S	SM	SM	SM	SM	SM					S	S	S		SM	SM	S	SM	SF			
3/27/53				S	SM	SM	SM	SM									SM	SM		SM	SF			
3/30/53					S	S	S	SM									S	S		S	S			
4/2/53								S																

M (Male)
F (Female)
S (Set Fruit)
O (No Flowers)

Date	Tree #7 Panicles				Tree #8 Panicles				Tree #9 Panicles				Tree #10 Panicles				Tree #11 Panicles				Tree #12 Panicles			
	1	2	2	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
3/4/53	M	M	M	M	M	M	M	M	F	F			M	M	M	M	M	O	M	M	O	M	M	M
3/9/53	F	F	MF	F	M	M	F	F	SM	SM			M	M	M	M	M	M	O	M	O	M	M	M
3/11/53	F	SF	F	SF	O	O	F	F	SM	SM			M	M	M	M	M	M	F	M	O	M	M	M
3/13/53	F	SM	F	SFM	O	O	F	SM	SM	SM			M	M	M	M	F	O	F	O	F	M	M	M
3/16/53	SM	SM	SM	SM	F	F	SM	SM	SM	SM			O	F	O	M	F	F	SM	F	SF	O	O	M
3/18/53	SM	SM	SM	SM	S	S	SM	SM	SM	SM			F	S	S	F	SM	S	SM	S	S	S	SF	F
3/20/53					SM	SM	SM	SM	SM				F	SM	SF	SF	SM	SM	SM	SM	SM	SF	SF	SF
3/23/53	SM	SM	SM	SM	SM	SM	SM	S	SF				SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
3/25/53	S	S	S	S	SM	SM	SM	S	SF	SF			SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
3/27/53					SM	SM	S		SF	SF			SM	SM	SM	SM	SM	SM	S	SM	SM	SM	SM	SM
3/30/53					S	S			S	S			SM	S	SM	SM	S	S		S	S	S	S	S
4/2/53													S		S	S								

the germination of lychee pollen. It was found that a 24% sucrose solution either alone or with 1% "Bacto" agar added resulted in a higher percentage of pollen-tube formation than did any other concentration of sucrose tested. Germination studies were made on three types of flowers using 24% sucrose alone and 24% sucrose plus 1% "Bacto" agar. Six slides were prepared using each media and examined to determine the percentage of pollen tube development after 24 and 48 hours storage. As the anthers of the hermaphrodite flowers functioning as females did not dehisce it was necessary to dissect the anthers to obtain the pollen grains. The results of this study are summarized in Table 3.

Table 3. Percentage of Lychee Pollen from Different Flower Types that Developed Pollen Tubes in Nutrient Solutions.

Type of Flower	Sucrose after		Sucrose & Agar after	
	24 hrs.	48 hrs.	24hrs.	48 hrs.
	%	%	%	%
Male, short stamens	13.0	15.7	29.0	45.4
Male, Long stamens	6.5	12.0	26.7	30.0
Hermaphrodite flower functioning as male, long stamens.	30.0	37.5	50.0	65.8
Hermaphrodite flower functioning as male, short stamens.	31.7	40.8	46.3	63.8
Hermaphrodite flower functioning as female	0.2	0.8	0.2	0.5

It is evident from these data that the pollen produced by hermaphrodite flowers functioning as males is considerably more viable than that produced by staminate flowers. It was interesting to find that although the anthers of the hermaphrodite flowers functioning as females fail to dehisce, they do produce a very small percentage of viable pollen.

Fruit Set

The question of fruit set is of utmost importance in the production of any fruit crop. Liu made detailed observations of the time of shedding of young fruit from 15 trees in Laurel, Florida. She found that there are more or less definite periods or stages when extensive dropping occurs. After going through several periods of fruit shedding during the first month, there seemed to be certain critical periods, after which if safely passed, the rest of the fruit will proceed to develop and reach full maturity. Her data are summarized in Table 4.

She also observed that apparently these critical periods for fruit setting are somewhat correlated with internal changes in the development of the embryo. The fertilization process and the following segmentation and growth of the embryo within the ovule are accompanied by changes in the surrounding ovary wall and often in the funicular tissues. Most noticeable among these changes is a thickening and an increase in size, change in color, shape and position of the young fruit, so that it is evident very soon after blossoming whether the fruit has or has not "set."

Liu dissected the young seeds from a large number of fruits which fell at different periods and summarized her findings as follows: a. Fruits dropped as a result of failure in fertilization. No embryo was found within the empty embryo-sac which was filled with sap. Apparently the embryo-sac had disintegrated prior to its maturation, therefore, fertilization was impossible. Fruits turned yellow to brownish color and fell with the pedicel, below which abscission took place. The phenomenon often occurred about 5 to 10 days after blossoming. The average size of fruit was about 1.5 cm. long and 0.7 cm. wide (e.g., in Sweet Cliff). b. Fruits dropped as a result of embryo abortion and the development of abnormal cotyledons, such as those with one or two lobes. It is evident that the growth was arrested because of morphological or physiological changes. Not impossibly some of it might have resulted from pollination with unreduced (diploid) pollen grains, resulting in triploid embryos. Unlike those of the first drop, these of the second drop have every external appearance of being normal. Fruits have developed from fertilization and have grown up to a certain stage. Ovules were found with slight embryo development. The cotyledons were always found to have one lobe on one and two or three lobes on the other. They were super-imposed on each other. The aril developed as in normal fruits, and enlargement corresponded to that appropriate for growth of from 2 weeks to 5 weeks. Growth was not carried to maturity. All evidences show that fertilization had occurred in the ovule in this group of immature young fruits, but normal growth was retarded to such an extent that reaching maturity was prevented by the abnormal development of the embryo.

Embryo-sac abortion becomes in certain instances a cause of seedlessness rather than unfruitfulness; but in some plants such as mango the embryo abortion at a later stage becomes a distinct cause of fruit dropping. If the embryo sacs degenerate and fruit still forms,

TABLE 4 DATA REGARDING DURATION OF FRUITING; PERCENTAGES OF FRUIT SETTING, RETENTION TO PARTIAL MATURITY, AND TO COMPLETE RIPENING; WITH INDICATION OF FAVORABLE TEMPERATURE AND HUMIDITY FOR FRUITING IN LYCHEE VARIETIES*

Sample No.	Variety	Plot and Tree No. in Lychee Orchard	No. of Panicles Observed	Av. % of Fruits per Panicle Set from 1st & 2d Flowering	Total Length of Fruit-Growing Period	Total Days of Fruiting from Pollination to Harvesting	Av. % of Fruits Remain on Panicle after One Month	Av. % of Fruits per Panicle Reach Maturity	Av. No of Days Required for complete Development of Aril	Favorable Temperature and Humidity for Fruiting (°F)	(%)
1	Brewster Chen Family Purple 陳家紫	II-5b	2	53	Mar.29–June 20	84	23	22	25	80-88	65-70
2	Brewster	M-9	2	34.3	Apr 3–June 30	89	13	12	25	85	70
3	Brewster	H-1	3	20	Mar 31–June 30	92	1**	1	30	85	70
4***	Brewster	I-1	3	32.3 (I) 27	Mar 14–June 24 Apr. 15–July 10	102 87	23.5 (I) 27	17 6 (I) 27	39 (I) 42	70-80	60-70
5	Brewster	L-9	3	59	Apr. 2–June 30	90	30	28.5	34	80-85	70
6	Brewster	L-8	1	57	Apr. 1–June 30	91	40	28.5	33	80-85	70
7	Brewster	K-6	2	53	Mar. 31–June 30	92	30	24	34	80-85	70
8	Kuei Wei Kwai Mi 桂味	II-3a	2	60	Apr. 1–June 22	83	23	22	29	80-88	65-70
9	Kuei Wei	II-3b	1	65	Apr 2–June 23	83	23	23	30	80-88	65-70
10***	Mountain Lychee 山枝	III	2	56.6 (I) 33	Apr 1–July 10 Apr. 29–July 25	101 88	15 (I) 22	5 (II) 12	31 (I) 35	80-88	60-70
11	Mountain Lychee	Z-4	3	26.3	Apr 4 – July 12	100	15.6	13	30	80-88	60-70
12	Yellow Red	Q-1	3	25 (I) 30	Mar 29–June 27 Apr 24–July 10	91 77	15 (I) 20	10 (I) 20	42 (I) 37	75-85	65-70
13	Late Globe	P-5	1	63	Apr 13–July 12	90	34	23	45	85-90	60-70
14	Sweet Cliff 甜岩	N-5	3	50	Apr. 5–June 27	84	35	25	28	85	70
15	Black Leaf Hak-ip 黑葉	E-2	2	65	Apr. 2–July 8	97	40	40	23	75-88	60-70

* 15 trees were selected, of which the same 33 panicles were observed every other day.

** Fruits were damaged by wind.

*** Seedling tree.

seedless specimens are produced. This gives more space for aril development provided the fruit remains on the tree till reaching maturity. The small-sized fruits set from the second flowering are often seedless but the fruit quality seems a little inferior to that of the seed-containing ones. The seedless fruits remain on the tree longer and reach maturity later. Their value has been long noticed and a seedless variety is valued commercially.

Mustard and Nelson made similar observations to determine the percentage of the original "set" fruit which remained on the tree until maturity. Their data are based on observations made on 40 panicles of ten trees of the Brewster variety. The number of set fruit was

determined at the time of shedding of the last male flowers from the panicles, two weeks later, and just prior to harvesting. These data are summarized in Table 5.

Table 5. Shedding of Immature Lychee Fruit in Dade County.

Tree No.	Number of Panicles Checked	Ave. Initial Number of Set Fruit	Ave. Number of fruit after 2 wks.	Ave. Number of fruit at maturity	Ave. % fruit at maturity
1	4	66	3	2	3.0
2	4	154	16	6	3.9
3	4	42	3	3	7.1
4	4	86	2	2	2.3
5	4	50	9	5	10.0
6	4	73	5	3	4.1
7	4	121	13	7	5.8
8	4	112	9	4	3.6
9	4	73	9	3	4.1
10	4	121	18	7	5.8

The data collected in Laurel and in Dade County show that the highest percentage of loss of fruit occurred during the first two to four weeks after the young fruit had set. It would seem that a fair estimate of potential crop yield might be made at the end of this period.

SUMMARY

The results of this investigation show that three types of lychee flowers appear consecutively on the same lychee panicle and that the shift from one type of flower to the other occurs as a gradual transition rather than as a sharp demarcation. The pollen produced by the different types of flowers varies in structure and in viability. The highest percentage of shedding of young fruit occurs during the first month after fruit "set." The shedding of young lychee fruit may be partially attributed to failure in fertilization and to embryo abortion.

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ROOTING GUAVA (PSIDIUM GUAJAVA L., c. SUPREME) STEM CUTTINGS IN A HYDROPONIC MIST-TYPE PLANT PROPAGATOR

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In conjunction with the guava breeding and selection programs currently underway in South Florida, considerable work has been done toward the development of a rapid method for the vegetative propagation of this plant. Propagation problems have been a major factor in the slow development of commercial guava culture. Only within the past fifteen years have research workers in Florida done any breeding and selection work with guava. Virtually all of the approximately 400 acres of commercial guava plantings in Florida in 1948 consisted of seedling trees (4). Seedling guava trees do not "come true" to a degree which would recommend the use of such propagation material. Vegetative reproduction methods are of prime importance in multiplying the selected mother trees produced by the breeding and selection programs (4, 7).

Prior to 1948, root cuttings were considered the only practical plant material for reproducing a scion. This method, although successful (3), results in serious injury to the parent tree if any number of cuttings are taken. In 1948, Ruehle suggested the application of the plastic wrapped marcot technique (5). This has proved a rapid and efficient method for vegetative reproduction, the only objections being that it requires considerable time to apply and it yields relatively few propagules per mother tree.

Mr. Roy Nelson, of the University of Miami Experimental Farm, has devised a patch budding method which appears as another solution to this problem. Budding supplies the answer to the problem of producing large numbers of propagules, but introduces another difficulty. Guavas are subject to the death of their aerial portions at freezing temperatures (4, 8). In the case of grafted or budded trees such injury would result in loss of the scion. Trees on their own roots will regenerate from root suckers and frequently only one crop will be