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Potential of Mango (*Mangifera* Sp.) As A Rootstock Based on The Characteristic of The Pelok and Seeds

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ABSTRACT
Superior rootstock is needed to produce quality mango seeds from clonal soma propagation. This research aims to identify the potential of local mango races (landraces) in Bali, which can be used as rootstock based on consideration of the nature of the pelok and seeds. Sampling locations were determined using a stratified random sampling method. Pelok and seed characteristics were analyzed on 36 identified mango plants, including Saigon and Lalijiwa, as comparisons. The pelok and seed characteristics variables observed followed the mango descriptor guidelines. The research results show that Sanih and Putih mangoes can be developed as rootstocks based on the qualitative characteristics of the pelok, the space filled with seeds on the pelok, the weight of the pelok, and the weight of the seeds. To develop this potential, these two accessions need to be further studied for their root strength, tolerance to environmental stress, resistance to pests and diseases, as well as their compatibility with scions of mango types that are of interest to the public, such as Arumanis, Manalagi, Golek, Bikul, Amplemsari, and other introduced types of mango.
Keywords*: Mango, Landraces, Traits, Stems, Seeds*

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I. INTRODUCTION

Propagation of mango plants (*Mangifera indica* L.) is generally carried out on a seed basis, namely generatively with seeds or through clonal soma methods, namely oculation and grafting. The oculation and grafting methods use rootstock from sowing seeds [1] and [13]. Propagation by attachment and connection requires suitable rootstock, strong roots, tolerant to environmental stress, tolerant to pests and diseases, and able to optimally support the appearance of the original characteristics of the type of mango to which it is attached or connected (compatible) [5]; [8]; [9]; [15]. That onion stems influence the quality of seeds, the characteristics of mango flowers, and canopy architecture [1], [2], and [10].

According to [7], two superior mango varieties have been released as rootstock, namely Kraton-119 and Madu 225. Keraton-119 was released in 2002 from the Shaigon mango, while Madu 225 was released in 2007. The use of Madu mango as Rootstocks has been carried out since the Dutch era (1941), namely as rootstocks from 298 mango germplasm accessions collected at the Cukurgondang Experimental Garden. Breeders have used Honey Mango for rootstock in the propagation of superior varieties of mango, especially Arumanis, Golek 31, Manalagi 69, and Durih, which were developed in East Java.

Mango seed breeders in Bali very rarely use Shaigon or Madu as rootstock. The primary consideration is that Shaigon mango seeds are challenging to obtain because the population is minimal. The population of Shaigon mangoes in Buleleng Regency is at most ten trees. Meanwhile, the Honey mango, known as the Lalijiwa mango, has an abundant population in Bali. This mango is quite popular with the public, so its price is relatively high, with an average of IDR 10,000/kg. The price is quite expensive, causing breeders to be reluctant to use it as a rootstock. If Sanih and White mangoes are available, seed breeders in Bali generally use them as rootstock. However, if the demand for seeds is relatively high, while the availability of Sanih and White mango seeds is insufficient, seed breeders use various types of mango as rootstock. Noyet's in-depth research has shown which types of mango stems are suitable for use as rootstocks, apart from Shaigon and Honey in Bali.

A total of 44 local mango accessions were identified in Bali [14]. Thirty-four of them, or 77.27%, were accessions of local races (land races). The remainder are non-landrace accessions. Accession landraces include Amplemsari (Legong), Bila, Bikul, Gedang Bontihing, Santog, Manggis, Dodol, Depeha, Sanih, Kunyit, Poh Wani Kubucepatan, Gandarasa, Amplemsari Tejakula, Gula, Kunahan, Amplem Taluh, Pudak, Ijo Bukit, Gading, Sambuk Mengwi, Kakul, Gedang Kelan, Lembat Tianyar, Taluh Tianyar, Siap, Santen Banjarangkan,

Lembongan, Pelem Nusa Penida, Sakti, Eni Bontihing, Eni Ban, Pakel Sibetan, and Pakel Sulangai. The potential of these accessions as rootstocks need to be identified, including based on the nature of the stem and seeds.

This research aims to identify the potential of local landraces in Bali that can be used as rootstocks based on consideration of the nature of the stem and seeds.

II. MATERIALS AND METHODS

2.1 Sampling Research Locations and Research Time

Sampling locations were determined using a stratified random sampling method [4] and [12]. The sampling was carried out in two stages. The first stage determines the location of the sampling district. Research samples were taken from 4 (four) districts and sorted based on the number of local mango accessions. The second stage was determining the sub-districts where samples were taken in each selected district. Each district selected four sub-districts with the highest number of local mango accessions. The research was conducted in June 2021 – February 2022.

2.2 Determining Data Source

Data from research results were obtained from the results of exploration and characterization of mango accessions in the field and in the laboratory (primary data) as well as extracting information from the community/farmers who own mango trees, fruit traders, and other related sources, such as agencies in charge of horticultural crop farming at the local level. Districts in Bali and at the Bali Province level.

2.3 Observed Variables

The variables observed for the characteristics of the stem and seeds followed the mango descriptor guidelines [6], as well as the results of measuring the stem and seeds using a ruler. The stem and seed characters were observed as follows.

Table 1: Observed Characteristics Of Stems and Seeds

No.	Peco/Seed Properties	No.	Peco/Seed Properties
1	Quantity of fiber in the rim 1=low 2=medium 3=high	7	Pelok.fruit ratio-^{1} (%) $= \frac{\text{Wheel weight}}{\text{Fruit weight}} \times 100$
		8	Beam length (cm), measured with a ruler from base to tip
2	Fiber length on the rim 1=short (<1 cm) 2=medium (1-5 cm) 3=length (> 5 cm)	9	Pelok width (cm), measure with a ruler the base, middle and ends. Results are averaged
3	Fiber adhesion to the rim 1=low 2=medium 3=high	10	Beam thickness (cm), measure with a caliper
4	The space is filled with seeds on the rim 1=< 25% 2=25-50% 3=51-75% 4=76-100%	11	Beam weight (g), by weighing the rim
5	Seed shape, done by observing the shape of the seeds on selected plants, compared with the mango descriptor guidelines 1=pointed (elliptical) 2=oval 3 = curved oval (reniform) 4=other	12	Seed to fruit ratio-^{1} (%) $= \frac{\text{Seed weight}}{\text{Fruit weight}} \times 100$
		13	Seed length (cm), measured with a ruler from base to tip
6	Seed color 1=white 2=yellowish white 3=reddish white 4=brownish white	14	Seed width (cm), measure with a ruler the base, middle and tip. Results are averaged
		15	Beam thickness (cm), measure with a caliper

2.4 Data Analysis

Data is analyzed using simple statistics: maximum value, minimum value, average, standard division, and variance. Next, the data that has been studied is described and interpreted. The appearance and characteristics of each accession were compared with those of the comparison accessions, namely Saigon and Lalijiwa.

III. RESULTS AND DISCUSSION

3.1 Qualitative Properties of Pelok and Seeds

The qualitative characteristics of the stems and seeds of Landraces mango accessions in Bali were observed through the quantity of fiber on the stem, the length of the stem fiber, the stickiness of the fiber to the stem, the space filled with seeds on the stem, the color of the seeds, and the shape of the seeds, showed that there were variations in the appearance of the traits, as in Table 2 and Table 3.

Table 2. Grouping of Mango Landraces Mango Accessions Based on Qualitative Characteristics of Pelok

No.	Pelok Nature	Trait Type	Accession
1.	Quantity of fiber in the rim	Low	Gedang Bontihing, Gedang Kelan, Lalijiwa*
		Currently	Amplemsari (Legong), Shaigon*, Bila, Bikul, Manggis, Dodol, Poh Depeha, Turmeric, Putih, Poh Wani, Ganda Rasa, Amplemsari Tejakula, Gula, Kunahan, Amplem Taluh, Pudak, Ijo Bukit, Gading, Kakul, Lembat Tianyar , Taluh Tianyar, Pitik, Santen Bakas, Lembongan, Poh Pelem, Poh Sakti
		High	Santog, Sanih, Sambuk, Poh Eni (Kweni) Bontihing, Poh Eni (Kweni) Ban, Pakel Sibetan, Pakel Sulangai
2.	Rim fiber length	Short	Amplemsari (Legong), Shaigon*, Bila, Bikul, Gedang Bontihing, Mangosteen, Dodol, Poh Depeha, Turmeric, White, Ganda Rasa, Amplemsari Tejakula, Gula, Kunahan, Amplem Taluh, Pudak, Ijo Bukit, Gading, Kakul, Gedang Kelan , Taluh Tianyar, Pitik, Santen Bakas, Lembongan, Poh Pelem, Poh Sakti, Lalijiwa*
		Currently	Santog, Sanih, Poh Wani, Sambuk, Lembat Tianyar, Poh Eni (Kweni) Bontihing, Poh Eni (Kweni) Ban
		Long	Sibetan Pakel, Sulangai Pakel
3.	Fiber adhesion to the rim	Low	Amplemsari (Legong), Amplemsari Tejakula, Poh Sakti, Lalijiwa*
	Fiber adhesion to the rim	Currently	Bila, Bikul, Gedang Bontihing, Santog, Mangosteen, Dodol, Poh Depeha, Turmeric, White, Poh Wani, Ganda Rasa, Gula, Kunahan, Amplem Taluh, Pudak, Ijo Bukit, Gading, Kakul, Gedang Kelan, Lembat Tianyar, Taluh Tianyar , Pitik, Santen Bakas, Lembongan, Poh Pelem,
		High	Shaigon*, Sanih, Sambuk, Poh Eni (Kweni) Bontihing, Poh Eni (Kweni) Ban, Pakel Sibetan, Pakel Sulangai

*) Comparative accession

Table 2 shows that accessions of mango landraces in Bali show variations in the appearance of curvature traits. A total of 25 accessions (69.44%) showed moderate fiber quantity. The remaining three accessions (8.33%) and seven (19.44%) had low and high fiber quantities, respectively. Examples of accessions representing each variation in fiber quantity properties are presented in Figure 1.

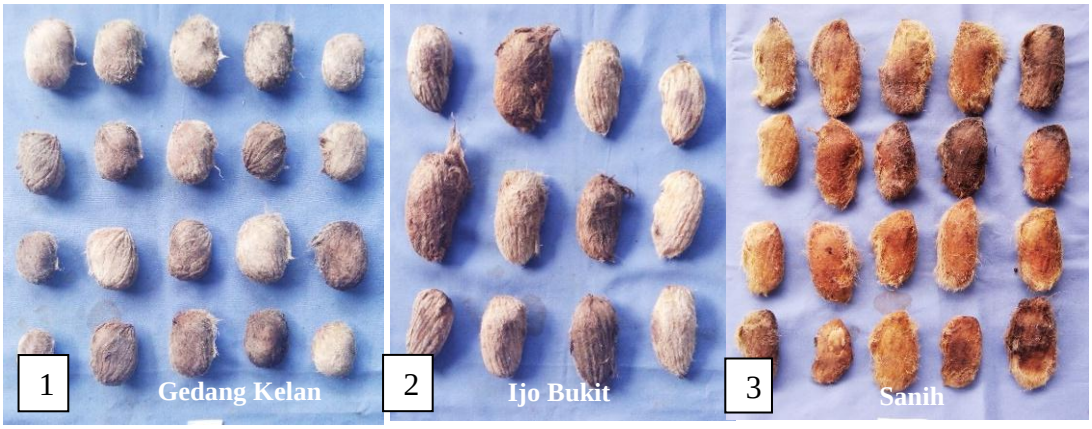

Figure 1: Quantity of Fiber in Local Balinese Mango Accessions (1) Low, (2) Medium, (3) High

Regarding long fiber length, of the 36 landraces mango accessions, including comparison accessions, 27 accessions (75%) had relatively short fibers. The remaining seven accessions (19.44%) were classified as medium, and two accessions (8.33%) had fibers classified as long. Accessions that have fibers classified as long are Pakel Sibetan and Pakel Sulangai.

Fiber stickiness to the rim also varies from low to high. A total of 25 accessions (69.44%) showed medium fiber stickiness, four accessions (11.11%) were low, and seven accessions (19.44%) were high. There is a tendency for accessions with long fibers and strong fiber attachment to the stem.

Shaigon has medium stem fiber quantity, short stem fiber length, and high fiber stickiness to the stem. Lalijiwa has medium fiber quantity on the rim, short fiber length on the rim, and low fiber stickiness to the rim. Sanih Mango has high stem fiber content, medium stem fiber length, and high fiber stickiness to the stem. Meanwhile, White Mango has medium stem fiber quantity, short stem fiber length, and medium fiber attachment to the stem. It is difficult to determine the potential of an accession as a rootstock based on stem characteristics. However, judging from the characteristics of Shaigon and Lalijiwa, the Sanih and Putih accessions qualify as rootstock based on the qualitative characteristics of their stems.

Table 3: Grouping of Lanraces Mango Mango Accessions Based on Seed Qualitative Characteristics

No.	Pelok Nature	Trait Type	Accession
1.	The space is filled with seeds on the rim	<25%	Bikul
		25-50%	-
		51-75%	-
		76-100%	Amplemsari (Legong), Shaigon*, Bila, Gedang Bontihing, Santog, Mangosteen, Dodol, Poh Depeha, Sanih, Turmeric, Putih, Poh Wani, Ganda Rasa, Amplemsari Tejakula, Gula, Kunahan, Amplem Taluh, Pudak, Ijo Bukit, Gading , Sambuk, Kakul, Gedang Kelan, Lembat Tianyar, Taluh Tianyar, Pitik, Santen Bakas, Lembongan, Poh Pelem, Poh Sakti, Poh Eni (Kweni) Bontihing, Poh Eni (Kweni) Ban, Pakel Sibetan, Pakel Sulangai, Lalijiwa*
2.	Seed Form	Oval	-
	Seed Form	Curved oval (reniform)	Amplemsari (Legong), Shaigon*, Bila, Bikul, Gedang Bontihing, Santog, Mangosteen, Dodol, Poh Depeha, Sanih, Turmeric, Putih, Poh Wani, Ganda Rasa, Amplemsari Tejakula, Gula, Kunahan, Amplem Taluh, Pudak, Ijo Bukit , Gading, Sambuk, Kakul, Gedang Kelan, Lembat Tianyar, Taluh Tianyar, Pitik, Santen Bakas, Lembongan, Poh Pelem, Poh Sakti, Poh Eni (Kweni) Bontihing, Poh Eni (Kweni) Ban, Pakel Sibetan, Pakel Sulangai, Lalijiwa *

*) Comparative accession

Continued Table 3: Grouping of Lanraces Mango Mango Accessions Based on Qualitative Seed Characteristics

No.	Pelok Nature	Trait Type	Accession
3.	Seed color	White	-
		Yellowish white	Amplemsari (Legong), Shaigon*, Bila, Bikul, Gedang Bontihing, Santog, Mangosteen, Dodol, Poh Depeha, Sanih, Turmeric, Putih, Poh Wani, Ganda Rasa, Amplemsari Tejakula, Gula, Kunahan, Amplem Taluh, Pudak, Ijo Bukit , Gading, Kakul, Gedang Kelan, Lembat Tianyar, Taluh Tianyar, Pitik, Santen Bakas, Lembongan, Poh Pelem, Poh Sakti, Lalijiwa*
		Reddish white	Brazil, Pon Eni (Kweni) Bontihing, Poh Eni (Kweni) Ban
		Brownish white	Sambuk, Pakel Sibetan, Pakel Sulangai

*) Comparative accession

The space filled with seeds on the rim shows the proportion of seeds on the rim and provides an idea of the size of the seeds. Of the 36 mango accessions, there was 1 (one) accession (2.77%) with seed-filled spaces on relatively low stems, namely Poh Bikul. The majority, or 35 accessions (97.22%) of the space filled with seeds on the stem, were classified as very high. Poh Bikul has a space filled with seeds on the peak, which is relatively low because, generally, this mango fruit has very flat seeds, even without seeds; in Balinese, it is called Ngumpen (Figure 2).

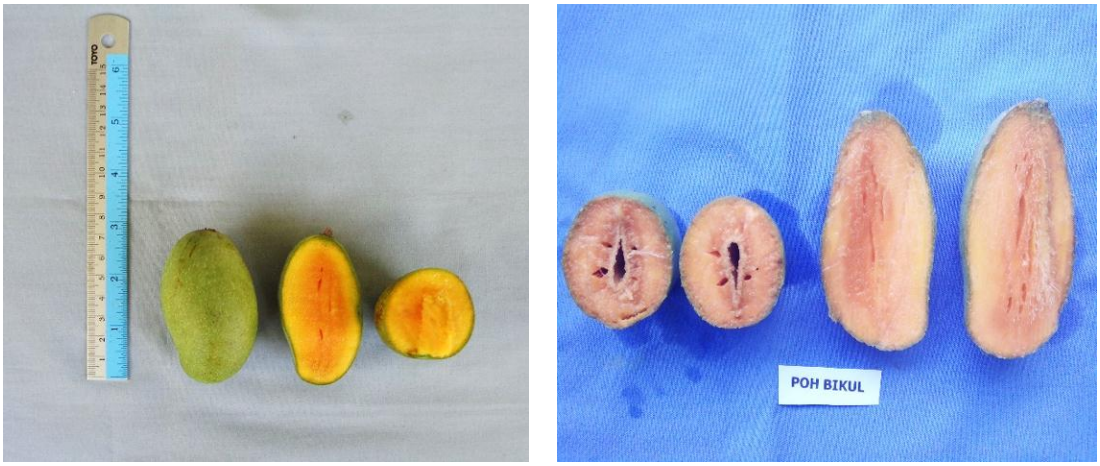

Figure 2: Ngumpen seeds on Poh Bikul

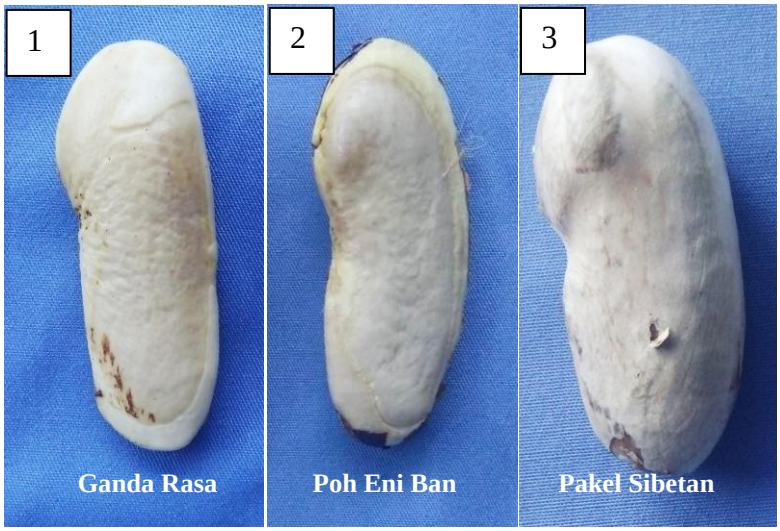

Figure 3: Seed color of local Balinese mango accessions
(1) Yellowish White, (2) Reddish White, (3) Brownish White

The seed shape of the mango accessions did not show a significant variation because the 36 accessions; 32 accessions, or 88.88%, showed a curved oval shape (reniform). The color of the seeds is quite varied; some are yellowish-white, reddish-white, and brownish-white. A total of 30 accessions (83.33%) had yellowish-white seeds. The remaining three accessions, 8.33%, had reddish-white and brownish-white seeds.

Of the three qualitative characteristics of seeds, it is estimated that only the space filled with seeds on the stem is related to the suitability of the seeds as rootstock because it characterizes the size of the seeds. The larger the space filled with pedal peak seeds, the larger the size of the seeds. Shaigon and Lalijiwa are in the space group filled with 76-100% seeds. Of the 36 mango accessions, only Poh Bikul had <25% seed space on the rim, which indicated that the seed size was tiny. Thus, judging from the space filled with seeds on the stem, only Poh Bikul has no potential as a rootstock.

3.2 Quantitative Properties of Pelok and Seeds

The quantitative characteristics of the stems are illustrated by the ratio of the stems to fruit-1, stem length, stem width, stem thickness, and stem weight (Table 4). Meanwhile, the quantitative characteristics of seeds can be observed from the ratio of seeds to fruit-1, seed length, seed width, seed thickness, and seed weight (Table 5).

Table 4: Quantitative Characteristics of Mango Landraces

No.	Accession	Pelok.fruit ratio $^{-1}$ (%)	Pelok Character			
			Beam Length (cm)	Beam Width (cm)	Beam Thickness (cm)	Beam Weight (g)
1	Shaigon*)	12,56	7,79	4,02	1,63	22,40
2	Lalijiwa*)	9,13	8,10	3,74	1,90	31,65
3	Amplemsari (Legong	20,59	7,92	2,93	1,59	27,25

No.	Accession	Pelok.fruit ratio $^{-1}$ (%)	Pelok Character			
			Beam Length (cm)	Beam Width (cm)	Beam Thickness (cm)	Beam Weight (g)
4	Bila	16,57	7,46	3,19	2,16	28,85
5	Bikul	7,33	5,82	2,43	0,81	6,40
6	Gedang Bontihing	30,83	5,47	3,97	2,44	35,50
7	Santog	12,26	7,54	3,33	1,75	25,35
8	Manggis	12,83	6,82	3,09	1,94	21,15
9	Dodol	21,12	8,21	3,48	1,95	37,10
10	Poh Depeha	7,68	9,41	4,05	2,06	34,90
11	Sanih	14,91	7,56	3,21	1,84	27,85
12	Kunyit	12,85	8,27	3,06	1,84	28,15
13	Putih	12,40	8,95	3,23	2,21	39,85
14	Poh Wani	11,85	6,86	3,22	2,00	32,90
15	Ganda Rasa	16,75	8,09	3,34	1,88	30,25
16	Amplemsari Tejakula	24,15	7,91	2,93	1,59	27,80
17	Gula	13,38	6,46	3,04	1,62	25,50
18	Kunahan	19,01	6,53	3,55	1,75	36,20
19	Amplem Taluh	18,15	6,85	3,46	1,73	31,15
20	Pudak	13,04	7,55	3,96	2,20	33,50
21	Ijo Bukit	15,43	6,62	3,24	1,90	25,80
22	Gading	19,39	5,55	2,60	1,77	23,33
23	Sambuk	29,89	9,04	3,64	2,53	72,30
24	Kakul	29,74	6,38	3,11	2,07	43,65
25	Gedang Kelan	30,76	5,49	3,98	2,45	35,60
26	Lembat Tianyar	11,12	8,18	3,43	1,91	27,50
27	Taluh Tianyar	21,29	5,58	2,67	1,37	26,50
28	Pitik	15,62	6,17	3,06	1,97	22,85
29	Santen Bakas	34,69	6,84	3,52	2,58	58,65
30	Lembongan	9,04	6,37	3,19	1,85	19,40
31	Poh Pelem	15,44	5,23	3,03	1,59	13,80
32	Poh Sakti	19,45	5,43	2,68	1,81	16,75
33	Poh Eni (Kweni) Bontihing	12,22	8,28	3,79	2,11	42,60
34	Poh Eni (Kweni) Ban	12,34	8,25	3,74	2,10	42,50

*) Comparative Accession

Continued Table 4: Quantitative Characteristics of Mango Landraces

No.	Accession	Pelok.fruit ratio $^{-1}$ (%)	Pelok Character			
			Beam Length (cm)	Beam Width (cm)	Beam Thickness (cm)	Beam Weight (g)
35	Pakel Sibetan	12,24	6,94	4,46	3,65	43,40
36	Pakel Sulangai	11,67	6,95	4,47	3,67	43,50
	Maximum	34,69	9,41	4,47	3,67	72,30
	Minimum	7,33	5,23	2,43	0,81	6,40
	Average	16,88	7,14	3,38	2,01	31,72
	Standard Deviation	7,05	1,13	0,49	0,53	12,07

*) Comparative Accession

Mango landrace accessions in Bali have a peek.fruit^{-1} ratio between 7.33 and 34.69%. The highest is Mango Santen Bakas, while the lowest is Poh Bikul. Fruit weight ranges from 6.40-72.30 g. Poh Sambuk has The highest rim weight and the lowest at Poh Bikul. Shaigon mangoes have a pelok.buah-1 ratio of 12.56%, higher than Lalijiwa's 9.13%. But in terms of rim weight, Lalijiwa is superior, namely 31.65 g. At the same time, Shaigon is only 22.40 g. This shows that a high pelok.a high fruit weight does not always accompany fruit-1 ratio. The rim's weight is related to its length, width, and thickness. Heavier rims have longer, wider, and thicker rims. Sanih mangoes have a pelok weight of 27.85 g, higher than Shaigon, but lower than Lalijiwa. White Mango has a pelok weight of 39.85 g, higher than Shaigon and Lalijiwa. This indicates that Sanih and White Mangoes have potential as rootstock based on the weight of their stems.

Table 5: Quantitative Characteristics of Landraces Mango Seeds

No.	Accession	Seed Character				
		Seed to fruit ratio-^{1} (%)	Seed Length (cm)	Seed Width (cm)	Seed Thickness (cm)	Seed Weight (g)
1	Shaigon*)	7,26	4,61	2,79	1,39	12,95
2	Lalijiwa*)	4,47	5,97	2,90	1,50	15,50
3	Amplemsari (Legong	10,12	5,96	2,29	1,28	13,40

No.	Accession	Seed Character				
		Seed to fruit ratio-^{1} (%)	Seed Length (cm)	Seed Width (cm)	Seed Thickness (cm)	Seed Weight (g)
4	Bila	10,16	6,25	2,87	1,92	17,70
5	Bikul	0,34	0,26	0,11	0,05	0,30
6	Gedang Bontihing	17,19	4,20	3,19	2,05	19,80
7	Santog	7,43	5,44	2,43	1,54	15,35
8	Manggis	6,91	4,88	2,53	1,47	11,40
9	Dodol	12,15	6,23	2,56	1,63	21,35
10	Poh Depeha	4,78	6,87	3,16	1,77	21,73
11	Sanih	11,63	5,86	2,49	1,59	21,73
12	Kunyit	7,74	7,08	2,49	1,52	16,95
13	Putih	8,03	6,77	2,66	1,75	25,80
14	Poh Wani	7,55	5,64	2,50	1,52	20,95
15	Ganda Rasa	8,08	5,73	2,41	1,41	14,60
16	Amplemsari Tejakula	11,60	5,96	2,28	1,27	13,35
17	Gula	7,71	5,16	2,41	1,31	14,70
18	Kunahan	11,21	5,27	2,96	1,34	21,35
19	Amplem Taluh	9,79	5,94	3,04	1,42	16,80
20	Pudak	7,20	6,05	3,28	1,81	18,50
21	Ijo Bukit	8,40	5,42	2,59	1,60	14,05
22	Gading	10,53	4,70	2,22	1,40	12,67
23	Sambuk	17,76	7,48	2,71	2,11	42,95
24	Kakul	19,08	5,19	2,32	1,42	28,00
25	Gedang Kelan	17,19	4,22	3,20	2,06	19,90
26	Lembat Tianyar	6,43	5,33	2,46	1,54	15,90
27	Taluh Tianyar	11,77	4,45	2,29	1,03	14,65
28	Pitik	11,00	5,38	2,43	1,59	16,10

Continued Table 5: Quantitative Characteristics of Landraces Mango Seeds

No.	Accession	Seed Character				
		Seed to fruit ratio-^{1} (%)	Seed Length (cm)	Seed Width (cm)	Seed Thickness (cm)	Seed Weight (g)
29	Santen Bakas	22,06	5,43	2,70	1,91	37,30
30	Lembongan	6,62	5,01	2,42	1,55	14,20
31	Poh Pelem	9,79	4,36	2,21	1,29	8,75
32	Poh Sakti	12,78	4,58	2,16	1,54	11,00
33	Poh Eni (Kweni) Bontihing	6,90	6,53	2,77	1,78	24,05
34	Poh Eni (Kweni) Ban	6,95	6,52	2,73	1,77	23,95
35	Pakel Sibetan	8,00	5,87	3,96	3,13	28,35
36	Pakel Sulangai	7,62	5,88	3,98	3,12	28,40
	Maximum	22,06	7,48	3,98	3,13	42,95
	Minimum	0,34	0,26	0,11	0,05	0,30
	Average	9,84	5,46	2,63	1,62	18,73
	Standard Deviation	4,40	1,21	0,61	0,51	7,87

*) Comparative Accession

The highest seed-to-fruit-1 ratio was found in Santen Bakas Mango (22.06%), while the lowest was in Poh Bikul (0.34). Fruit weight ranges from 0.30 to 42.95 g. The highest seed weight was found in Poh Sambuk and the weakest in Poh Bikul. Shaigon mangoes have a seed-to-fruit-1 ratio of 7.26%, higher than Lalijiwa at 4.47%. However, in terms of seed weight, Lalijiwa is higher, at 15.50 g. At the same time, Shaigon is only 12.95 g. Seed weight is determined by seed length, width, and thickness. The heavier the seed, the longer, wider, and thicker the stem size. Sanih mangoes have a seed weight of 21.73 g, higher than Shaigon and Lalijiwa. White Mango has a pelok weight of 25.80 g, higher than Shaigon and Lalijiwa. This indicates that Sanih and White Mangoes have potential as rootstock based on the weight of the seeds.

Poh Sanih and Putih are accessioned with 100% or compact seed space on the stem, with a more excellent stem and seed weight than Shaigon and Laliijiwa. These two mangoes have a polyembryonic embryonic type [13]. Based on observations in the field, Poh Sanih and Putih is relatively resistant to drought, has solid and deep roots, and is relatively resistant to pests and disease. So far, the seeds of this accession have been used by seed breeders as mango rootstock. Economically, Sanih mangoes are relatively low quality because when ripe, the flesh is very soft and contains a lot of fiber. This condition causes many plant owners to cut down their trees, so this accession is rarely found in the field. This mango has the potential to be developed as a VUB-producing mango rootstock. According to [11], the rootstock requirements for mango propagation are sturdy, healthy growth, resistance to root disease, and a good and strong root system. According to [7], two

superior mango varieties have been released as rootstock, namely Kraton-119 and Madu 225. Keraton-119 was released in 2002 from the Shaigon mango, while Madu 225 was released in 2007.

IV. CONCLUSION

Sanih and White mangoes have the potential to be developed as rootstocks based on the qualitative characteristics of the stem, the space filled with seeds on the stem, the weight of the stem, and the weight of the seeds. To develop this potential, these two accessions need to be further studied for their root strength, tolerance to environmental stress, resistance to pests and diseases, as well as their compatibility with scions of mango types that are of interest to the public, such as Arumanis, Manalagi, Golek, Bikul, Amplemsari, and other introduced types of mango.

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