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DETERMINATION OF OPTIMUM HARVEST INTERVAL FOR "RED PETIOLE" DASHEEN, *COLOCASIA ESCULENTA VAR. ESCULENTA*, IN DOMINICA

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ABSTRACT: An experiment on maturity was conducted to determine the optimum harvest interval for "Red Petiole" dasheen *Colocasia esculenta (L.)* Schott var. *esculenta* in Dominica. Results showed that yield components (yield/hectare, corm weight, length and width) for 8 and 9 months harvest intervals were significantly higher ($p < 0.001$) than other harvest intervals of 5, 6, and 7 months and larger and more marketable corms were produced. No significant differences were observed for specific gravity (SG) and % dry matter (DM) between different harvest intervals. Responses to sensory evaluation showed a taste preference for 8 and 7 months harvest intervals (30 and 23%). Significant differences were observed for storage life ($p<0.001$) with the storage life for 8 month harvested corms being more extended (19 days). Based on the percentage of marketable corms, taste preference and storage life the results indicate, that the harvest intervals of 8 months is the appropriate time to harvest "Red Petiole" dasheen cultivar grown under such edaphic conditions.

INTRODUCTION

Dasheen (*Colocasia esculenta (L.)* Schott var. *esculenta*) or Taro as it is more commonly referred to, is a root crop grown throughout the humid tropics and is a very important food in the Pacific. There are many cultivars which differ in: colour of the tuber flesh, which may be white, pink or yellow; the colour of the lamina and veins; with or without purple spot on the upper surface above the insertion of the petiole; the colour of the petiole, which may be various shades of green, or pinkish purple to almost black; some are streaked; the acridity of tuber and leaves (Purseglove, 1985).

Dasheen is one of the major root crops grown and exported from the Caribbean. Currently good markets (ethnic) exist for Caribbean dasheen both in the United Kingdom and the United States that is not fully exploited, though exporters enjoy a comparative advantage (Pilgrim, 1998). In Dominica many cultivars exist but the main cultivar predominantly grown for export is the "common type" (Robin, 2000). This cultivar is distinguished by a large purple spot on the lamina, dark green petiole with white flesh that turns grayish blue on cooking. It forms a single corm, which tends to be oval to round in shape.

The Dominica Export and Import Agency (DEXIA) has identified a niche market in the US with a preference for "red" dasheen. The "pink petiole" dasheen is the only cultivar on the island that seems to come close to DEXIA's described specification of the "red" dasheen. This cultivar has a pink petiole with the flesh having a slightly reddish tinge colour. Since this cultivar is not cultivated commercially, very little information is available on the stage of maturity it should be harvested.

Different maturity indicators (Purseglove, 1985; Robin, 1993) and combinations (crop age from date of planting, senescence of leaves, cracking of soil surface around the base of the plant as the mature corm forces itself upwards and specific gravity measurements) have been used to determine the optimum maturity stage for harvesting dasheen. There have been conflicting reports from the local farmers on the optimum maturity stage for harvesting the "pink petiole" dasheen ranging from 5 to 9 months after planting. This wide range makes it extremely difficult for recommendations to be made to commercial producers, as a result CARDI was mandated to fine tune optimum harvesting time of this cultivar.

METHODOLOGY

The trial began on 17/03/2000 and was conducted on young soils, montmorillonitic in nature without a silica pan (Atkins, 1983) with an average annual rainfall of 2550-5000mm. The trial consisted

of six randomised blocks, each block contained five treatments. Treatments comprised five harvest intervals: 9, 8, 7, 6 and 5 months. Plots size was 25m² (270 ft²), each plot contained 54 plants, spaced at 0.61m x 0.76m (2.5 ft x 2.0 ft). The various treatments were planted one month apart (Table 1). This allowed for all treatments to be harvested on the same day (18/12/2000).

Table 1. Planting dates for each harvest interval (treatment).

Harvest Interval (months)	Date of planting
9	17/03/2000
8	18/04/2000
7	18/05/2000
6	20/06/2000
5	19/07/2000

The improved husbandry practices of dasheen (Robin 1997 Guide to Producing and Handling Quality Dasheen in the OECS) were adopted throughout the trial. All treatments were harvested during the week of December 10, 2000. Corms were cleaned to remove dirt, root and dead tissue. Tail and stem ends were cut off with a sharp knife to leave 1.3 x 4.0cm stalks. Data were collected on yield components (weight, length and width), specific gravity, dry matter and storage life of the corms. A sensory (organo-leptic) evaluation was carried out in Dominica to determine consumer acceptability. Plans to carry out similar organo-leptic evaluation in the USA were unsuccessful. The data was analysed by the Analysis of Variance method (ANOVA)

Yield Component

Corms were weighed using a Hanson Hanging Balance Scale - Model 842. A Mechanic Type 6911 caliper was used for measuring the length and width of corms. Corm length measurements were taken from the point of attachment of the leaf stalk to the base. Corm width was measured at the widest part of the corm.

Specific Gravity (SG)

Corms were washed and dried thoroughly. Corms were then weighed in air (x) and in water (y). The formula x/x-y (Burton, 1989) was used for calculating SG.

% Dry Matter (DM)

Corms were peeled, cut into small pieces and then grated. Ten grams (w_1) of each grated sample was placed in a pre-weighed crucible and oven dried (w_2) for 36 hours at 100°C. During drying, samples were periodically removed from the oven, weighed until there were no differences in weight. Percentage DM was calculated using the formula (w_2/w_1) x 100. Specific gravity and dry matter have been used as indicator of maturity for various tuber crops with high SG coinciding with crop maturity. There is also a positive correlation between specific gravity and dry matter.

Storage life

Six freshly harvested corms for each treatment were washed and stored at ambient temperature. Corms were observed daily for sprouting, shriveling, fungal growth and rotting over a storage period of 21 days. Rotted corms were cut longitudinally and examined internally.

Sensory (Taste) Evaluation

A sensory evaluation by 12 assessors, using an acceptability (good, satisfactory, poor and unacceptable) test, was used to determine corm acceptance for eating. Corm samples for each treatment were peeled then cooked for ½ hour before the assessment was conducted.

RESULTS AND DISCUSSION

Yield Components

Table 2 gives the mean values for yield components for different harvest intervals. The effects of harvest interval on yield components (yield/hectare, corm weight, length and width) were highly significant ($P < 0.001$). Eight and 9-month harvest intervals gave highest yields - 19.6 and 24.3 t/ha respectively when compared to that of corms harvested at 5, 6 and 7 months respecively. Mean corm weight, length and width was also higher for 8 and 9-month old corms.

Table 2. Mean yield per hectare, corm weight, length and width of the "Red petiole" dasheen harvested between 5 and 9 months.

Harvest Interval	Mean yield/hectare. (t/ha)	Mean corm Weight (kg)	Mean corm length (cm)	Mean corm width (cm)
5 month	8.5	0.48	7.75	7.65
6 month	9.1	0.42	9.23	7.82
7 month	10.3	0.48	10.78	7.83
8 month	19.6	0.91	14.53	9.60
9 month	24.3	1.12	16.77	10.08
SEM (20 d. f.)	1.6	0.08	0.61	0.29

Table 4 shows corms were well shaped i.e. oval and uniform for all treatments. There was a significant difference for shape (length/width ratio) between treatments ($P<0.001$). Corm shape varied between round to oval (1.0 to 2.0). There was also a significant difference for percentage marketable corms ($P<0.001$). Corms harvested at 8 and 9 months produce larger and more marketable corms when compared with those harvested at 5, 6 and 7 months (Tables 2 and 3).

Table 3. Length/width ratio and percentage marketable corms for different harvest intervals for "Red petiole" dasheen.

Harvest Interval	Length/Width	% Marketable Corms
5 month	1.01	7.8
6 month	1.18	11.1
7 month	1.38	12.2
8 month	1.51	52.2
9 month	1.66	57.8
SEM (20 d. f.)	0.06	6.2

Specific Gravity (SG) and % Dry Matter (DM)

There was no significant difference for the specific gravity and % DM results presented in Table 4. Specific gravity varied from 0.972 to 1.616 for the different harvest intervals with 7 (1.616) and 9 (1.268) month harvest intervals having the highest SG. However percentage DM varied for different

harvest intervals with 9 (38.7%) and 6 months (35.4%) having the highest % DM. Corms harvested at 5 months had the lowest SG and % DM.

Table 4. Specific gravity and percentage dry matter for different harvest intervals for "Red petiole" dasheen.

Harvest Interval	Specific Gravity	% Dry Matter
5 month	0.972	32.6
6 month	1.198	35.4
7 month	1.616	33.3
8 month	1.124	33.4
9 month	1.268	38.7
SEM	(6d.f.) 0.975	(4 d. f.) 2.2

Sensory (Taste) Evaluation

Table 5 shows the various responses to taste preference for different harvest intervals for "Red petiole" dasheen. Thirty and 23 % of the assessors rated corms harvested at intervals of 8 and 7 months respectively as having good taste. Fifty percent rated corms harvested at 9 months unacceptable taste, together with 24.8% for both 5 and 7 months

Table 5. Response to taste preference for different harvest intervals for "Red petiole" dasheen.

Harvest Interval	% Good	% Satisfactory	% Poor	% Unacceptable
5 month	19.2	28.9	0.0	24.8
6 month	15.3	20.1	39.9	0.0
7 month	23.2	24.1	0.0	24.8
8 month	30.8	12.0	20.1	0.0
9 month	11.5	15.9	40.0	50.4

Storage-life

Table 6 shows the storage life (number of days to 50% rotting) for different harvest intervals, for corms stored over a 21day period at ambient temperature. Significant differences were observed for storage-life ($P<0.001$). Rotting was the main cause of shelf-life reduction. Storage life of corms harvested at 8 months was more extended (19 days) than corms of other harvest intervals. No sprouting or fungal growth was observed for corms throughout the storage period. However shrivelling due to water loss affected all treatments.

Table 6. Storage life for different harvest intervals of "Red petiole" dasheen corms over 21 days of storage.

Harvest Interval	Number of Days to 50% rotting
5 month	14
6 month	12
7 month	15
8 month	19
9 month	10
SEM (16 d.f.)	1.2

CONCLUSION

Based on yields, percentage of marketable corms, taste preference and storage-life for different treatments, the harvesting interval of 8 months is the most appropriate time for harvesting the "red petiole" dasheen cultivar under such edaphic conditions. Fifty two percent corms harvested were marketable, 30.8% of the assessor thought the corms were of good taste and the corms had an extended shelf life 19 days to 50% rotting, which exceeded corms harvested at other intervals by an average of six days. Though the specific gravity and dry matter were the highest for 9-month harvest interval and are indicators of physiological maturity, other factors such as taste and storage-life were of greater significance from a marketing point of view.

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