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SHORT COMMUNICATION

GROWTH, YIELD AND QUALITY ASSESSMENT OF SOME GOTUKOLA *(Centella hydrocotyle & Oenantha* spp.) SELECTIONS

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INTRODUCTION

Gotukola (*Centella asiatica* Engl. Indian Penyworth; Tam. Babasa, Orila ramaral, Vallarai) is a small plant and often used in Asian herbal medicine. It is widely distributed in Australasia, Southern Africa, Madagascar, India, Nepal, Sri Lanka and the Pacific. The edible qualities, pleasing taste and medicinal properties have made it popular as a green leafy vegetable in the diet of Sri Lankans, and they believe that it contains remarkable longevity properties and rejuvenates the brain and body. This plant contains an unknown vitamin, which is known as Vitamin X or youth vitamin, because it was found to have a beneficial effect on the brain and endocrine gland (Shinard, 1991). It acts as an aperient tonic, is a diuretic, with anti-bacterial, anti fungal, antitoxic, antiameobic, anti-inflammatory (for external use), anti-spasmodic, aphrodisiac and has anti-ageing effects. It is particularly beneficial for treatment of arthritis and skin diseases, and many other problems (Shinard, 1992).

Past research indicates that this herb is a rich source of vitamins A, B, C, G and K, magnesium, and the antibiotic asiaticiside, and madecassic acids (Martindale, 1982). This herb also contains the alkaloid hydrocotyline and a bitter tasting, volatile oil vellarine obtained principally from the roots (Jayaweera, 1982).

Identification and characterization have been done for three bush type gotukola selections (Perera, 1990) and two runner types (Perera, 1996). The two runner type varieties were selected for problem soils in Nilwala Ganga Project area. Apart from this, very little information is available on growth, yield and quality characters of gotukola varieties grown on a commercial scale.

Since hybridization of this crop is difficult, the best way to produce good quality high yielding varieties is through selection from available local germplasm. In this study, attempts were made to identify the local germplasm from *Centella, Hydrocotlye* and *Oenantha* spp. (Krahulik and Theobald, 1981) and evaluate their growth parameters, eating quality and yield potential.

MATERIALS AND METHODS

Field experiments were conducted at Horticultural Crops Research and Development Institute, Gannoruwa during *yala* 1996, *maha* 96 /97 and *yala* 97. Sixteen gotukola selections (G1,G3,G4,G5,G6,G7,G8,G9,G11,G14,G15, G17,G18, G20,G21 and G23) collected from different locations were evaluated in a preliminary yield trial during *yala* 1996. The experimental design was a Randomized Complete Block and plot size was 4.5 m x 1 m. with three replicates. Runners and plantlets were planted at a spacing of 20 cm x 20 cm. All selections received fertilizer applications according to the Department recommendations. Plant type and growth parameters such as length of stalk, leaf area and yield were recorded at 3 months after planting.

Further evaluation was done on 4 promising selections G3, G5, G8 and G23 along with one introduction G19, for growth parameters, yield potential and eating quality. Growth parameters such as length of stalk, number of leaves and number of runners per plant and leaf length and width were recorded at each harvest. Harvesting was done at 2 ½, 4 ½ and 7 ½ months after planting. Composition of selections was measured using 100g of edible portion. Quality assessments were done using a 500g sample of the edible portion of each selection.

RESULTS AND DISCUSSION

Of the 16 selections evaluated in the preliminary investigation, 6 were found to be bush type and the rest runner types. Significantly higher yields were recorded with G3, G4, G5 and G8 than with the other selections. Yield of G11 and G17 were significantly low when compared to yields of other selections.

The two high yielding bush type selections G4 and G5 had similar growth characters. Selection G5 was identified for further evaluation. Of the 11 runner type selections, G3 and G8 were selected for further evaluation due to high yielding ability and large leaf size. Selection G23 was identified as a variety with export quality (medium size, dark green tender leaves, medium stalk length and light purple coloration at the base). In addition, an introduction G19, which has a different growth habit, was also included.

Results of further evaluation indicated that two runner type selections G3 and G8 produced larger leaves with greater leaf breadth and length than the other selections (Table 1). Consumer preference for these selections was always low due to roughness of leaves. Selections G5 and G23 produced medium-size leaves, which are preferred by consumers. Except G19, which

produced ovate compound leaves, all the other selections produced uniform single leaves.

Table 1. Leaf characters of gotukola selections.

Selection	*Leaf type*	*Shape*	*Margin*	*Length (cm)*	*Breadth (cm)*	*Leaf colour*
G3	Single	Reniform	Dentate	4.1	6.5	Dark green
G5	Single	Reniform	Dentate	3.4	5.2	Light green
G8	Single	Reniform	Dentate	4.8	6.7	Dark green
G19	Compound	Ovate	Dentate	2.4	1.7	Light green
G23	Single	Reniform	Slightly dentate	2.5	4.2	Dark green

Significantly higher number of leaves/plant was recorded at 1st and 2nd harvests in the G5 bush type. Since the bush type had not produced runners, number of leaves produced/plant was high, but number of leaves was reduced at 3rd harvest. Selection G23 produced significantly higher number of runners at 1st and 3rd harvests (Table 2). If a selection produces more runners, it will have the ability to cover the ground easily and suppress weed emergence. This is an important character in the production of planting material. Selection G19 had lower number of compound leaves per plant at all three harvests (Table3).

Table 2. Number of leaves/compound leaves produced per plant at different harvests.

Selection	*1st (2 ½ MAP)*	*2nd (4 ½ MAP)*	*3rd (7 ½ MAP)*
G3	46.66 c	39.67 b	41.90 b
G5	122.33 a	73.67 a	44.13 b
G8	42.40 c	38.67 b	35.67 c
G19	17.00 d	14.67 c	11.33 d
G23	66.00 b	48.00 b	61.67 a
CV %	4.07	5.80	16.20

MAP = Months after planting

Table 3. Number of runners per plant at different harvests.

Selection	*1st (2 ½ MAP)*	*2nd (4 ½ MAP)*	*3rd (7 ½ MAP)*
G3	6.66 b	5.66 a	5.66 b
G5	6.66 b	5.33 a	5.73 b
G19	6.33 b	5.33 a	3.13 c
G23	10.00 a	5.00 a	7.33 a
CV %	8.28	10.90	5.64

MAP = Months after planting

Stalk length was significantly higher in G3 and G8 at all three harvests (Table 4). These two selections produced larger leaves and growth rate was

faster than other selections. Stalk length is an important character when making bundles and short stalks are generally not desirable.

Table 4. Length of the stalk/stem* (cm) of selections at different harvests.

Selection	*1st (2 ½ MAP)*	*2nd (4 ½ MAP)*	*3rd (7 ½ MAP)*
G3	24.67 a	13.73 a	11.53 a
G5	8.26 b	11.67 ab	7.13 c
G8	24.67 a	14.27 a	11.63 a
G19*	10.47 b	10.50 bc	8.30 c
G23	11.07 b	8.83 c	10.06 b
CV %	9.70	11.3	10.30

Continuous yield reduction was recorded in the bush type selection G5, which could be due to reduction in the number leaves per plant at each harvest (Table 2). Since bush types do not produce runners, the root system is restricted to one particular place and continuous harvesting may result in unavailability of nutrients. Significantly higher yields were recorded in selections G3 and G8 at all three harvests than in other selections. This could be due to larger leaf size and longer leaf stalk (Tables 1 & 4). Even though selection G23 recorded a comparatively lower yield than the other selections, it produced higher number of leaves than the runner types G 3 and G8 at all three harvests (Table 2). This could be an advantage of selection G23, because gotukola is generally marketed as bundles and not on weight basis.

Table 5. Yield of gotukola selections at different harvests.

Selection	*1st (2 ½ MAP)*	*2nd (4 ½ MAP)*	*3rd (7 ½ MAP)*	*Mean*
G3	21.9 a	13.2 b	14.9 a	16.7
G5	11.7 c	7.8 c	3.6 c	7.7
G8	22.8 a	55.8 a	18.5 a	18.4
G19*	18.5 ab	13.3 b	4.3 c	12.0
G23	15.9 bc	8.5 c	13.0 b	12.4
CV %	9.00	13.3	20.30	

MAP. = Months after planting

Moisture, crude fiber and inverted sugar contents were highest in selection G3 (Table 6). Selection G5 contained lower moisture content than the other selections. Selection G23 recorded very high protein content. Nitrate accumulation was not recorded in any of the selections and oxalate was found only in trace amounts. Very low ash content was recorded in selection G8, which is related to high mineral content.

Table 6. Composition of gotukola selections (g/100g edible portion).

Selection	*% Moisture*	*Crude fibre*	*Vit. C (mg)*	*Protein*	*Oxalate*	*Nitrate*	*Invert sugar*	*Ash*
G3	85.2	2.1	33.9	2.1	Trace	-ve	1.1	0.6
G5	81.6	1.6	22.9	2.9	Trace	-ve	0.8	0.9
G8	84.5	1.6	33.9	2.9	Trace	-ve	0.7	2.4
G19	84.5	1.2	33.9	0.8	Trace	-ve	0.7	0.4
G23	83.1	1.2	22.3	3.6	Trace	-ve	0.8	0.3

-ve= negative

All the characters related to eating quality ranked high in selection G23, which therefore can be considered as the best selection (Table 7). Better appearance could be due to its medium-size dark green leaves. High quality of this selection could be related to high protein' content. Preference for selections G3 and G5 was low.

Table 7. Eating quality rating* of gotukola selections.

Selection	*Appearance*	*Colour*	*Smell*	*Taste*	*Acceptance*	*Overall mean*
G3	72	65	47	54	55	58.6
G5	64	56	54	56	69	59.8
G8	66	67	56	60	59	65.8
G19	68	60	60	55	55	59.6
G23	73	74	65	65	68	69.0

* quality rating : 10 = very bad 100 = very good

CONCLUSIONS

Selection G8 and G3 have very high yield potential but eating quality is poor. These selections could be utilized in the food processing industry for dehydration. The bush type selection G5 produced intermediate-size leaves and the yield potential is very low. Continuous harvesting of this selection could be a problem. G 23 is a runner type selection having intermediate-size leaves, high protein content and number of leaves per plant. Eating quality of this selection is high. This selection could be popularized among farmers and consumers.

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