



Development of an improved kangkong variety with assessment of its profitability for commercial cultivation and suitability for balcony cultivation

Sitesh C. Biswas*

BRAC Agricultural Research & Development Centre, BRRI, Joydebpur, Gazipur, Bangladesh

*Corresponding author: sitesh.cb2@gmail.com

Abstract

An improved type good quality kangkong advance line '*Reddish stem kangkong*' has been developed at BRAC Agricultural Research & Development Centre (BARDC) through the hybridization between an exotic white flowered kangkong variety and a local light purple flowered variety. This improved variety is characterized by excellent vigour, faster growth, reddish stem, good spreading, higher rate of sprout production after each fresh vegetable harvesting, light purple coloured flower, tolerance to major diseases, good adaptability and higher production of vegetables as well as better seed yield. Its fresh vegetable yield has been recorded as 10-11 Mt/acre. Its seed production is also profitable as 400 – 450 kg/acre of good quality seeds can be obtained and a high percentage of seed germination can be ensured during the cultivation of this new kangkong variety. Its nice flavour, good taste and almost '*Deshi*' type (traditional type) appearance created a good market demand in the vegetable market. Besides commercial cultivation its rooftop or balcony cultivation is also easy and cultivating this '*Reddish stem kangkong*' variety on a balcony; a dual purpose can be served i.e. safe fresh vegetables can be consumed regularly and side by side its aesthetic beauty can be enjoyed like an ornamental plant.

Key words: Balcony cultivation, hybridization, *Ipomea reptans* Poir, kangkong, leafy vegetable, profitability.

INTRODUCTION

Kangkong (*Ipomea reptans* Poir) or '*Kolmi shak*' or '*Water spinach*' or '*Water Morning Glory*' belong to the family Convolvulaceae is being used as a popular leafy vegetable in the Indo-Bangladesh subcontinent since time immemorial and it is also used as vegetable in other Asian countries as well due to its good taste and relatively cheaper price (Yuliandira *et al.* 2023). Traditionally, in this subcontinent in the rural areas naturally grown sub-aquatic form of kangkong is used as a very common vegetable while the newly introduced cultivated form of a totally terrestrial type variety named '*Gima kolmi*' (released by BARI) is being used as a popular commercial variety recently in Bangladesh (Razzaque *et al.* 2000) along with the

similar type of varieties from other seed companies as well.

Owing to its high nutritional value and medicinal properties kangkong is also used in treating gastrointestinal diseases and curing anaemia (Igwenyi *et al.* 2011). It is a very cheap source of iron, β -carotene, calcium, lutein, fibre, etc. which improves eye health, ensures better hair growth and helps in maintaining good quality hair, reduces constipation problems, and slows down the aging process as well. Its overall antioxidant, low calorific and low-fat properties, good flavour and nice taste have increased the market demand for this leafy vegetable in the Indo-Bangladesh sub-continent in recent decades.

Since the terrestrial type kangkong can be grown almost throughout the summer season as home garden or market garden vegetables and the young shoots as well as leaves can be collected starting from 25-30 days either plant raised from seed sowing or planting of cuttings and after that fresh vegetables can be harvested at 15 days intervals almost 4-5 months profitably by the cut-and-come-again process, now a days a good number of commercial vegetable growers of Bangladesh particularly the growers of the peri-urban areas are cultivating this very productive nutrient-rich water spinach as a fast-growing vegetable commodity. Its young shoots are used either as simply boiled, stir-fried or other culinary preparations in different Asian countries including Bangladesh, India, Pakistan, Nepal, China, Malaysia, Indonesia, Philippines etc. It can also be mentioned here that due to its soft nature, excellent taste and nice flavour it is also used in soup preparations, for making 'Kolmi Bora' (a traditional type of fried food preparation) etc. in international quality hotels, restaurants as well. Due to its easy cultivation method now in the township areas improved varieties of kangkong are also being grown on rooftops or pot cultivation on the balcony and fresh vegetables are being harvested regularly through cut-and-come-again practice in Bangladesh.

By growing kangkong on a balcony, its dual purpose can be served i.e., i) it can be used as a fresh vegetable and ii) by training its twigs on balcony grills kangkong offers aesthetic beauty at the flowering and fruiting stage. Moreover, kangkong plants can also be utilized successfully in tree-vegetable agroforestry as it has been observed that it is very much compatible with the tree saplings of *Mahogoni*, *Sisso*, *Rain tree*, etc. used for raising in the forest areas and farmers can increase vegetable production significantly following this practice of agroforestry (Islam *et al.* 2004). Despite its use as food and for other purposes in Bangladesh, very little work has been done on the improvement of kangkong although there is enough scope for improvement of this particular nutrient-rich leafy vegetable. Since this vegetable can be propagated by both sexual & asexual means (through clonal propagation), varieties having desirable characteristics can be developed easily by the application of different suitable breeding techniques. Furthermore, since kangkong can be grown with minimum investment and sequential harvesting can be made from this fast-growing leafy vegetable for a longer period (nearly about 4 -5 months) and its seed production is also easy a kangkong breeding programme was initiated at BARDC (BRAC Agricultural Research &

Development Centre) for the improvement of this highly potential leafy vegetable crop.

MATERIALS AND METHODS

To develop a new kangkong variety at first an introduced exotic white flowered Filipino kangkong variety (used as ♀ parent) characterised by high vigour, longer large vines with broad thicker leaves, higher fresh vegetable yield (but susceptible to anthracnose disease at the later stages of growth and development which usually hampered its good quality seed production) was crossed with a local purple flowered kangkong landrace (used as ♂ parent) characterised by stress-tolerant, relatively slower growth rate having better twining habit, increased branching and tasty narrow thinner deep green leaves, as well as twigs during the year 2010 and their F₁ hybrids were raised successfully (Table. 1, Figs. 1 & 2). Phenotypically the F₁ hybrids were found to be intermediate type between the two parents and all the F₁ hybrids produced purple flowers at the flowering stage. Seeds of the F₁ hybrids were harvested at the end of the season and following pedigree method finally an improved type of kangkong i.e., '*Reddish stem kangkong*' was developed at BARDC with the characteristics listed below:

Characteristics of the 'Reddish stem kangkong' line (Figs. 3 & 6 -10):

1. *It has been developed through the hybridization between a Filipino kangkong with the local type kangkong variety.*
2. *'Deshi' type well-adapted variety; besides the peak winter season its cultivation is commercially suitable throughout the year.*
3. *Reddish coloured stem and has a reddish hue in its younger leaves.*
4. *Fast-growing bushy type vigorous plant with relatively standard size nice shaped deep green leaves. Tolerant to major diseases (anthracnose & white blister) & pest attacks and has high regrowth potential giving rise to many young shoots after each cutting.*
5. *First harvesting starts from 25-30 days and successive harvesting can be made at 15 days' intervals.*
6. *It is very popular to consumers as it is similar to the 'Traditional' or 'Deshi' type kangkong, ensuring better quality and taste.*
7. *Yield per acre is 10-11 tons and it can be easily accommodated in the agroforestry system.*
8. *Seed yield/acre is around 400-450 kg and the seeds have good germinability.*
9. *Fresh vegetables can be harvested for a longer period of time and seeds can also be obtained from the same*

plants if the plants are grown and management practices are followed judiciously.

10. Suitable for rooftop and balcony cultivation. It produces a good no. of showy flowers for up to 4-5 months and provide aesthetic beauty of the balcony for a considerable period.

RESULTS AND DISCUSSION

Development of the 'Reddish stem kangkong' line:

Basically the process of the improved type kangkong variety development started after the introduction of the exotic '*Filipino kangkong*' variety at BRAC Agricultural Research & Development Centre (BARDC). Actually, the '*Filipino kangkong*' variety is otherwise a very good variety for commercial cultivation but during the monsoon season, its leaves & twigs become unsuitable for consumption due to the production of its extra-large size leaves and its broad twigs in the peak monsoon season when the crisis of vegetables are usually observed in the kitchen markets

of Bangladesh. Furthermore, its commercial seed production also becomes difficult in the seed production season due to its high degree of susceptibility to 'Anthracnose disease which causes damage to the fruit-bearing vines at the fruit maturity stage. Consequently, the seed production per unit area is decreased significantly and the quality of the seeds obtained after harvesting also becomes very poor. Therefore, a breeding program was designed to develop an improved type of kangkong variety to overcome these problems. And keeping this view in mind this exotic '*Filipino kangkong*' variety was crossed with an indigenous '*Local type kangkong*' variety to incorporate reddish stem colour, stress-tolerant characteristics, moderate size narrow leaves in the monsoon season and disease-tolerant characteristics of the traditional type kangkong in the genetic background of the '*Filipino kangkong*' variety (Fig. 1).

Table 1. Major characteristics of the female & male kangkong parents.

<i>Filipino kangkong (female parent) (Fig. 1, Table. 2).</i>	<i>Local kangkong (male parent) (Fig. 1, Table. 2).</i>
<ol style="list-style-type: none"> 1. Excellent seedling growth, larger plants having high vigour, faster growth, broad hollow stem, longer internode length & less bushy type plant with good uniformity rate. 2. White flowered variety; leaves are large and relatively thicker, green, broad, smooth, moderately soft but less tasty. 3. Moderate resprouting, and vigorous sprout growth which ensures frequent harvesting (fresh vegetables can be harvested with an interval of 12-13 days). 4. Good quality leafy vegetable having a moderate taste spreading. 5. Easy to cultivate and can be grown only in the summer season. Vegetables can be harvested from 35-40 days after seed sowing or planting of cuttings. 6. 20-25% increased vegetable production can be obtained from the newly introduced <i>Filipino kangkong</i> than the existing commercial variety. Its fresh vegetable production is around 4-5 Mt/acre. 7. Susceptible to white blister & anthracnose disease therefore its seed production is hampered by disease severity. 8. Unsuitable for cultivating in the monsoon season. 	<ol style="list-style-type: none"> 1. Relatively slower seedling growth, very narrow stem, thinner and relatively smaller narrow leaves. 2. Good looking purple flowered local variety and has a tasty reddish stem, twigs and deep green palatable younger soft leaves. 3. Moderate branching habit which ensures better spreading. 4. Yield is very low but good quality twigs and leaves have better taste. 5. Fresh vegetable production is near about 2-3Mt/acre. 6. Plants are hardy type and have wider adaptability. Grows voluntarily even in relatively drought soil. 7. Tolerant to major disease & pest attacks and also suitable for cultivating in the monsoon season.

Table 2. Comparative studies on morphological & yield-related characteristics of Filipino and local kangkong varieties grown in *Kharif-2* season.

Name of the varieties	Plant length (cm)	No. of branches/plant	Length of internodes (cm)	Width of internodes (cm)	Length of leaves (cm)	Width of leaves (cm)	Days taken to 1 st flowering	Total no. of fruits/plant	No. of seeds/plant	Fresh fruit wt./fruit (g)	Seed yield/plant (g)	Crop duration
Filipino kangkong	251.00	16.00	7.25	1.00	12.57	7.21	38.00	319.80	905.00	1.61	43.65	135.00
Local kangkong	150.40	10.20	6.75	0.50	7.16	3.27	36.00	280.00	594.00	1.20	23.57	130.00
% increased over local variety	66.89	56.86	7.40	100.00	75.55	120.48	5.55	14.21	52.35	34.17	85.19	3.84

F₁ hybrids of crossing between Filipino kangkong X Local kangkong variety: F₁ hybrids of kangkong were produced through the hybridization between the *Filipino kangkong* and *Local kangkong* variety. To obtain F₁ hybrids, mature buds of the female parent *Filipino kangkong* were emasculated in the afternoon on the previous day of pollination and were protected through bagging. Similarly, matured buds of male parent i.e., the *Local kangkong* variety were also covered by brown paper bags before anthesis to collect its fresh pollens. Next day in the morning (at 8.30 A.M.) fresh pollens collected from the male parent were subsequently dusted on the stigma of the female parent (*Filipino kangkong* variety). After successful pollination, pollinated flowers were covered by bags to avoid contamination and normal cross pollination. Few days later viable fruits were developed from the artificially pollinated flowers. These fruits were allowed to grow to form bigger shapes and to obtain healthier seeds from these fruits by clipping of the apical portion of the targeted vines i.e., the vines which produced the fruits after crossing was done accordingly. At the end of the season, healthy F₁ seeds were collected from these fruits. After drying these seeds were preserved for using them in the next season.

In the following season i.e during the summer season these F₁ seeds were planted in the experimental plots at BARDC in a row keeping the distance between plants 45 cm. All along 9 F₁ plants were obtained and all the plants had reddish hypocotyl like the male parent at the seedling stage which confirmed the successful crossing as the seedlings of the pure female parent always develop greenish hypocotyls. All the F₁ plants were allowed to grow to provide necessary

cultural practices as and when required. Morphological characters of the F₁ hybrids (at 68 DAS) have been presented in Table 3. Actually, all the F₁ plants exhibited uniform growth from the very seedling stage. At 68 DAS these F₁ hybrids had good vigour having plant length of 29.33 cm with good spreading habit (plant diameter -25 cm). It can be mentioned here that a good no. branching/plant was also noticed in all the hybrids (7.67) and the range of internode length was recorded as 2.17 – 4.07 cm (Table. 3) which is very much shorter than the female parent and check variety (Table. 4). Deep green but relatively narrow thicker leaves were produced by the hybrids. Length and width of 3 maximum expanded leaves were recorded as 9.45 and 3.39 cm respectively in the hybrids which is much shorter than the female parent and also from the check variety. From the marketing point of view relatively shorter internodes having relatively narrow and short size leaves are desirable. Moreover, in the monsoon season, variety like Filipino water spinach with longer internodes and larger leaves which also produce longer internodes and oversize leaves makes them unsuitable for marketing in the monsoon season when the market demand for leafy vegetables becomes higher. In the meantime, the plants reached at fresh vegetable harvesting stage (at 53 DAS). Plant wt. of the 2 hybrids was taken and its value was recorded as 107.33 gm at 68 DAS. Clone of the F₁ hybrids were also developed from their cuttings and were grown on pots (Fig. 2) to assess their suitability for their cultivation in pot condition through cloning. At the end of the season, fresh F₂ seeds from the hybrids were harvested. In the F₂ generation, plants with desirable characteristics (i.e., excellent vigour, reddish stem colour, stress-

tolerant characteristics, moderate size narrow leaves in the monsoon season and disease tolerant characteristics etc.) were selected and the selection followed by selfing and subsequent cultivation

cycles were continued up to 6th generation to obtain the expected advance line having desirable characteristics (Figs. 3 - 10).



Fig. 1. Male (left) & female (right) parents of the newly developed improved type '*Reddish stem*' kangkong.



Fig. 2. Newly developed clone of the F₁ hybrid kangkong grown in pot condition (this plant has been raised from the cutting of one F₁ hybrid).

Table 3. Studies on morphological characters of different F₁ hybrids of crossing between Filipino kangkong and Local kangkong variety grown in the Kharif season-1 (at 68 DAS)

Crossing combination	Plant length (cm)	Plant spreading (cm)	No. of branches/plant	Internode length (cm)	Length of 3 expanded leaves (cm.)	Width of 3 expanded leaves (cm)	Plant wt./ (g)	Days taken for 1 st cutting
Filipino kang-kong X Local kang-kong	29.33 (28.00-30.00)	25.00 (23.00-26.00)	7.67 (6.00-9.00)	2.81 (2.17-4.07)	9.45 (7.17-10.07)	3.39 (2.03-4.40)	107.33 (60.00-70.00)	53.00

Table 4. Compare the F₁ hybrids, and female parent & check with respect to internode length and leaf dimensions.

Name of the entries	Internode length (cm)	Length of 3 expanded leaves (cm)	Width of 3 expanded leaves (cm)
F ₁ hybrids of Filipino kangkong X Local kangkong	2.81 (2.17-4.07)	9.45 (7.17-10.07)	3.39 (2.03-4.4)
Filipino kolmi (♀ parent)	7.25	12.57	7.21
BARI Gima kolmi (Check variety)	6.70	11.16	6.57

Disease reactions of the newly developed advanced line of kangkong: Although the Filipino kangkong had high vigour, longer and broad internodes, and had larger leaves with high productivity; market demand of for this variety was not up to the mark and both *Filipino* kangkong, as well as check variety (Gima kolmi), usually suffer from '*white blister*' and other diseases if grown in the monsoon season (Figs. 3 & 4). But from our observation, it was evident that the newly developed advanced line of kangkong i.e. '*Reddish*

stem kangkong' was found to be tolerant to white blister and other diseases (Figs. 3, 4 & 5) when it is grown during the same monsoon season. Usually, diseased twigs & leaves lose their marketable quality and also affect seed production significantly, as a result, the farmer becomes looser by growing these kangkong varieties commercially. From this perspective, '*Reddish stem kangkong*' has additional benefits which has the potentiality to tolerate the attack of major diseases found in kangkong. Biswas (2018)

reported earlier the high degree of tolerance of diseases and insects in coloured vegetables compared to green vegetables. Similarly, in yardlong bean disease-tolerant purple podded yardlong bean lines have also been developed (Kuswanto *et al.* 2013, Biswas 2022).

Earlier in sweet potato, Hughes *et al.* (1963) also developed wilt resistant lines using ‘Tinian’ (PI 153655) as resistant parent and HM 15, a moderately wilt susceptible line.



Fig. 3. Fresh twigs of ‘Red stem kangkong’.



Fig. 4. Disease tolerant nature of the newly developed ‘Reddish stem kangkong’ line.



Fig. 5. Compare between diseased leaves of the commercial variety ‘Gima kolmi’ (left) and disease free leaves of ‘Reddish stem kangkong’ (right).



Fig. 6. A nice plot of ‘Reddish stem kangkong’ at blooming stage.

Production cost & income from improved kangkong variety: In an attempt to assess the profitability 15 gm fresh seeds of improved kangkong variety were sown in a seed bed on 15.03.15 to raise healthy seedlings. Almost cent per cent of seeds was germinated and providing proper nursery management practices, healthy seedlings of kangkong were obtained in the seed bed. Since it was intended to obtain healthy and true-to-type kangkong plants, thinning was completed at the very early stage of the seedlings and the vigorous young plants were allowed to grow up to a 1-

meter length of vines from which cuttings were collected to be used for their planting in the main plot. Side by side, the main plot (1.5 decimal) was selected from a portion of 10 decimal plot which was relatively high land so that during the rainy season the excess water can be easily drained out from the plot and the plants do not suffer from waterlogging. For planting material prospective cuttings (10-11 cm) of the selected seedbed-grown plants having at least 2 prominent nodes were treated by dipping the cut ends into the 2% fungicide solution (Indofil) and planted

into the main plot keeping the distance plant to plant 30 cm. and row to row 75 cm. After planting kangkong cuttings and providing necessary cultural practices; healthy sprouts were developed from the nodes of the cuttings and within 43 days after planting all the uniform-sized plants reached at the stage of fresh vegetable harvesting. At 1st harvesting, a total of 9 kg of fresh vegetables were harvested from the plot. Owing to the nice appearance of the harvested bundles of these vegetables could be sold easily to customers at suitable market prices (Figs. 3, 4 & 5). Due to its good taste and nice flavour, after consumption, the consumers again placed their demand for purchasing vegetables to be harvested at 2nd harvesting. At 2nd harvesting, 23 kg (255.55% higher than 1st harvesting) of vegetables were obtained as proper management practices were followed to obtain the increased quantity and better quality of vegetables. Third, fourth, fifth, sixth, and seventh harvesting of the newly developed kangkong variety was made at 75, 100, 124, 141 & 158 days respectively in the monsoon season. But plants having excessively longer internodes and oversize leaves could not be observed at the peak monsoon season (Figs 7, 8 & 9). It can be mentioned here that the highest quantity of vegetables (43 kg) was

harvested from 5th harvest (Table. 4). In Bangladesh, from 1st week of June to 2nd week of November is the dull season for vegetables and this is why the harvested fresh kangkong was sold easily at the market price from the farm gate (Table. 4). Production cost and net profit of kangkong cultivation in 1.5 decimal of land has been presented in Table. 5.

It is interesting to note here that since the crop was cultivated in the monsoon season- a little irrigation was required throughout its growing period which reduced the production cost considerably. From this experiment it can be assumed that following this practice, a farmer will be able to harvest 10933.33 kg of vegetables (around 10 metric tons) per acre and he will be able to earn 2,49,466.66 Tk. (equivalent to \$ 3118.33) by selling good quality vegetables by cultivating BRAC developed improved kangkong variety in the rainy season.

After 7th successful harvesting, the kangkong twigs developed buds and all the plants came into flowering. Since this newly developed variety produced a huge no. of healthy fruits; finally, 3.45 kg of good quality seeds were obtained from the 1.5 decimal plot (Table 5, Fig. 10).

Table 4. Harvesting record & income in the monsoon season from selling fresh vegetables before flowering in ‘*Reddish stem kangkong*’ at BARDC.

Parameters	Harvesting							Total	Remarks
Harvesting no.	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th		Marketing of good quality fresh vegetables is the major advantage which gives additional benefit to the growers. Moreover, its seed production is also profitable.
Date	27.05.15	16.06.15	29.06.15	24.07.15	18.08.15	03.09.15	20.09.15		
Days after planting	43	62	75	100	124	141	158	158	
Quantity of fresh vegetable at each harvesting (kg)	9.00	23.00	18.00	14.00	43.00	26.00	31.00	164.00	
Total production (kg) (cumulative)	9.00 (0.60 mt/acre)	32.00 (2.13 mt/acre)	50.00 (3.33 mt/acre)	64.00 (4.26 mt/acre)	107.00 (7.33 mt/acre)	133.00 (8.86 mt/acre)	164.00 (10.93 mt/acre)	164.00	
% higher than successive harvesting	—	(255.00%)	(56.33%)	(27.92%)	(72.06%)	(20.87%)	(23.36%)	10993.31	The growth rate was found to be highest between the 1 st & 2 nd harvesting with respect to growth between each harvesting.
Production (kg)/acre in each harvesting	600	1533.33	1200.00	933.33	2866.66	1733.33	2066.66		The quantity of vegetables was relatively lower in 4 th harvesting as the plot was affected by heavy rainfall.
Price rate (Gazipur Veg. Market)	20/=	15/=	15/=	20/=	20/=	40/=	25/=		-
Total sales amount (Tk)/acre (US Dollar)	12,000/= (\$ 150.00)	22,500/= (\$281.25)	18,000/= (\$ 225.00)	18,660/= (\$233.25)	57,320/= (\$ 716.50)	69,320/= (\$ 866.50)	51,666/= (\$ 645.82)	164 (10.93 Mt/acre)	Total income/acre = 2,49,466.66 (\$ 3118.33)

Table 5. Production cost & income from improved kangkong variety from 1.5 decimal plot in the monsoon season.

Sl.no.	Cost items	Tk. (in 1.5 decimal)	Income					Net Profit
			Fresh vegetable		Seed		Total Tk. (veg.+ seed)	
			Quantity (kg)	Tk.	Quantity (kg)	Tk.		
01	Labour	458.00	164.00	10933.00	3.45	483.00 (@ 140 Tk. per kg)	11416.00	10,197.00
02	Fertilizer	565.00						
03	Pesticides	166.00						
04	Seed	30.00						
Total		1219.00						



Fig. 7. 'Reddish stem kangkong' plot at BARDC (after 6th harvesting).



Fig. 8. One 'Reddish stem kangkong plant (after 6th harvesting).



Fig. 9. Bunch of 'Reddish stem kangkong' ready for sale.



Fig. 10. Flower & fruits of 'Reddish stem kangkong'.



Fig. 11. 'Reddish stem kangkong' on balcony grills.



Fig. 12. Flowered twigs of 'Reddish stem kangkong' on balcony grills.

Growing improved kangkong variety in the balcony:

Growing short-duration vegetables on rooftops as well as on the balcony has become a new trend of vegetable production in Bangladesh. To observe the performance of the 'Reddish stem kangkong' its seeds were sown in pots on 28.03.20 and the pots were placed on the balcony with a sufficient supply of sunlight. Necessary management practices were provided to ensure better plant growth and development, and after 45 days of sowing, 1st harvesting could be started. Following 1st harvest, 2nd and 3rd harvests were also made for the consumption of safe fresh vegetables in the family. After that few cuttings of the selected healthy plants were planted in pots to obtain healthy plants at the flowering time. These cutting-developed plants were trained on balcony grills for good spreading. Finally, these well-grown plants came into flowering in mid-October and since the light purple flower colour of the new variety was very attractive-its aesthetic beauty was enjoyed up to April of the next year (Figs. 11 & 12).

CONCLUSION

In Bangladesh, the demand for safe leafy vegetables is increasing day by day due to their enormous health benefits and much cheaper price rates in the vegetable market. Moreover, commercial cultivation of these

easy-growing short duration vegetables requires minimum input as well as labour to grow and become ready for sale within 45-46 days. On the other hand, to ensure the regular supply of better quality nutritious vegetables for this country's ever-increasing population, Bangladesh has to increase the production of vegetables like kangkong from which huge quantities of fresh vegetables can be obtained regularly through the *cut-and-come-again* method. From this perspective, the newly developed highly productive BRAC kangkong variety will be a suitable leafy vegetable variety from which both farmers, as well as consumers, will be benefitted considerably.

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