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Short communication

Performance of baby corn varieties under agro-climatic conditions of Goa

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ABSTRACT

Field studies during three seasons, *i.e.*, *rabi*, summer and *kharif* for two years were conducted at ICAR Research Complex for Goa, Old Goa to evaluate the performance of baby corn varieties for commercial cultivation. Results indicated significant differences among the varieties, seasons and between variety and season for all the characters. Morphological characters such as plant height, leaves per plant and stem girth were found maximum in all the varieties grown during *rabi* season. Maximum plant height (168.56 cm) and highest number (14.32) of leaves per plant were recorded in G-5406. Comparatively, varieties were found early in maturity during summer season. Among the varieties, VL-42 was found early (44.67 days) while Mridula (55.89 days) as late. The ratio of dehusked cob weight to green cob weight was higher in *kharif* season and the highest ratio was noticed in VL-42 (0.18) and VLBC-1 (0.17) grown in summer. Higher cob weight, dehusked cob weight, dehusked cob length and diameter, cobs per plant, cob yield, dehusked cob yield and fodder yield were observed in winter season crops for all the varieties. Golden Baby was found superior variety for most of the characters in all the seasons. Higher net returns and benefit : cost ratio were noticed in Golden Baby, G-5406 and Mridula.

Key words: Baby corn, varieties, evaluation.

Goa has warm and humid climate with a distinct rainy season from June to September. Average annual temperature, relative humidity and rainfall of the state are 22-33°C, 58-88% and 2,700-3,000 mm, respectively. Maize is grown on a small scale as a mixed crop in vegetable fields during winter and summer seasons in Goa. Baby corn is a delicious and nutritive vegetable and its nutritive value is comparable with several high priced vegetables like cauliflower, cabbage, okra, beans etc. (Thakur, 7). It is highly remunerative crop which fetches sizeable income to the farmer within two or three months. There is a vast scope for cultivation of baby corn in Goa as there is a regular demand. There were reports on performance of baby corn varieties at different locations of the country during *kharif* (Anon, 1; Nandal *et al*., 2; Pandey *et al.*, 4; Thakur *et al.*, 8) and summer (Sukanya *et al*., 6). In addition to cobs, baby corn produces lush green and fresh stalks which are nutritious, succulent and highly palatable fodder for cattle. There is no scientific information available on this crop in the state. Thus, studies were conducted to evaluate the performance of some baby varieties of the crop during winter, summer and *kharif* seasons of Goa to identify the most promising variety season-wise and stable variety for year round production.

A series of experiments were carried out at ICAR Research Complex for Goa, Old Goa for three seasons during two years. The temperature prevailed during the crop period was ranged from 19 to 34°C in *rabi*, 24 to 35°C in summer and 24 to 29°C in *kharif*, whereas relative humidity ranged from 35 to 78% in *rabi*, 50 to 86% in summer and 82 to 95% in *kharif* season. Seven varieties, namely, VL-42, VLBC-1 (Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora), COBC-1 (TNAU), Golden Baby (Nunhems Seeds Pvt. Ltd), Mridula (Unicorn Seeds Pvt. Ltd), G-5406 (Syngenta India Ltd.) and Madhuri (Directorate of Maize Research, New Delhi) were evaluated in randomized block design with three replications. Crop was raised on three different plots of same location having 0.67% organic carbon, 75.6 kg available phosphorous and 308.2 kg/ha available potassium. Soil was lateritic in nature having pH 5.4 and EC 0.037 mmhos/cm. The crop was grown under irrigated conditions during *rabi*, and summer and rainfed conditions in *kharif* (rainfall recorded during the crop period was 2,416 mm). Farm yard manure @ 25 t/ha, N @125 kg (half dose), P @ 40 kg and K @ 30 kg/ha were applied in furrows at the time of seed sowing and rest of N was top dressed one month after sowing. Seeds were sown at a spacing of 50 cm between rows and 30 cm within a row. Standard cultural practices including detasseling were carried out in time during the crop period. Cobs were harvested on second day after emergence of silk from cob. Observations on various attributes like plant height, maturity, cobs per plant, green cob weight, baby corn weight, baby corn length and diameter, green cob yield, baby corn

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yield and fodder yield were. The collected data were analyzed statistically using combined analysis of variance (Rangaswamy, 5).

Plant height was maximum (Table 1) in *rabi*, while the minimum was recorded in *kharif* season. Water stagnation due to continuous rain and slightly low temperature during the growth period might have retarded plant growth in *kharif* season. Among the varieties, G-5406 produced plants having the maximum height while plants with minimum height were noticed in VL-42 followed by Madhuri. Varieties Golden Baby, COBC-1 and VLBC-1 were found on par with one another. Plants were taller in G-5406, Golden Baby, VLBC-1 and Mridula in *rabi* season. Plants were found dwarf in VL-42 grown in *kharif* season. Good plant height in all the varieties particularly in *rabi* is attributed to congenial weather conditions. Of all the seasons, more number of leaves per plant was observed in all the varieties during *rabi* season. Among the varieties, G-5406 produced the highest number of leaves per plant whereas VL-42 recorded the lowest number of leaves. Significantly the highest number of leaves per plant was recorded in G-5406 and closely followed by Mridula in *rabi* season, whereas the lowest number of leaves was observed in VL-42 in summer.

Stem girth indicates mechanical strength and amount of food reserves present. Stem girth recorded in all the varieties during *rabi* season was found to be the maximum when compared to other seasons. Maximum stem girth was noticed in Mridula, which was significantly superior to others while the minimum was observed in Madhuri. Plants of Mridula grown during *rabi* and summer seasons had more stem girth. Summer season hastened maturity while *rabi* season delayed it in all the varieties. Weather parameters particularly high temperature during summer might have forced the plants to enter into reproductive phase early. Varieties VL-42 and VLBC-1 were found early in summer, whereas Mridula was found late in *rabi* season. Long vegetative phase in *rabi* might be a probable reason for delay in harvesting of cobs but early maturity and dwarfness are preferred characters of baby corn varieties. Of all the varieties, VL-42 was found early in maturity, while Mridula was late in harvesting of cobs (Table 1).

Among the three seasons, green cob weight (Table 2) was found maximum in *rabi* season in all varieties. Cob weight recorded in Mridula was the maximum while it was the minimum in VLBC-1. Cobs produced by G-5406, Mridula and Golden Baby were weighed more in all the three seasons, whereas, VLBC-1 recorded less cob weight. Number of cobs per plant and average cob weight are main components, which decide the economic yield of a baby corn variety. Maximum dehusked cob or baby corn weight was obtained in *rabi* while the minimum was in *kharif* season. Dehusked cob weight recorded in Golden Baby during *rabi* was recorded maximum, while it was minimum in COBC-1 during summer. Among the varieties, maximum and minimum dehusked cob weights were noticed in Golden Baby and COBC-1, respectively. The ratio of dehusked cob weight to green cob weight was found higher in *kharif* season, whereas, it was lower in *rabi* season. This may be attributed to better partitioning of photosynthates to cobs as compared to husk. Of all the varieties VLBC-1 had the highest dehusked cob weight to green cob weight ratio while the lowest ratio was obtained in Mridula. Better ratio of dehusked cob to green cob weight was observed in VL-42 and VLBC-1 during summer and Golden Baby in *kharif* season while the poor ratio was noticed in Mridula and G-5406 grown during *rabi* season.

Dehusked cob diameter (Table 2) was found maximum in *rabi* season while it was minimum in *kharif* season. Maximum and minimum dehusked cob diameter was observed in Mridula and COBC-1, respectively. Big size dehusked cobs were noticed in Mridula grown during *rabi* whereas small size cobs were seen in COBC-1 during *kharif* and summer seasons. Marketing point of view, dehusked cob length is an important feature in baby corn varieties and it was ranged from 8.13 to 9.62 cm. Maximum dehusked cob length was noticed in *rabi*, while the minimum in *kharif* season. Cobs produced by Madhuri followed by Golden Baby were lengthy whereas the smaller cobs were harvested in G-5406, VLBC-1, Mridula and COBC-1. Interaction between season and variety showed the maximum dehusked cob length in Madhuri during *rabi* and the minimum length in G-5406 in *kharif* season.

Prolificacy is a distinguishing feature of baby corn varieties when compared with other types of maize. A baby corn variety should bear at least three cobs per plant without losing quality, size and shape (Kumar *et al*., 2). In respect of number of cobs per plant, results were found non-significant (Table 3) between *rabi* and summer seasons. More number of cobs per plant was reported in VLBC-1 and Golden Baby, while the less number of cobs per plant was harvested in COBC-1. Interaction effect between variety and season shown that the variety VLBC-1 produced the highest number of cobs per plant during *rabi* and the lowest number of cobs per plant was noted in variety COBC-1 grown in *kharif* season. More number of cobs per plant may be due to better partitioning efficiency. Green cob yield per hectare obtained in *rabi* in all the varieties was markedly superior to other seasons. Varieties G-5406 and Golden Baby which were found on par

Table 1. Performance of baby corn varieties for growth characters and maturity grown in different seasons of Goa.

Variety	Plant height (cm)				Leaves/plant				Stem girth (cm)				Days to harvest			
	Rabi	Summer	*Kharif*	Mean	*Rabi*	Summer	*Kharif*	Mean	*Rabi*	Summer	*Kharif*	Mean	*Rabi*	Summer	*Kharif*	Mean
VL-42	155.03	131.20	112.03	132.76	11.57	11.13	11.40	11.37	7.47	6.77	5.90	6.71	48.00	42.33	43.67	44.67
VLBC-1	190.47	148.73	115.53	151.58	13.40	12.33	12.60	12.78	6.83	5.57	5.70	6.03	47.00	43.33	45.67	45.33
COBC-1	180.93	150.63	127.50	153.02	13.07	12.03	12.07	12.39	7.27	6.87	6.03	6.72	57.33	47.67	52.33	52.44
Golden Baby	191.07	150.90	121.57	154.51	13.60	13.67	13.00	13.42	7.93	7.57	6.40	7.30	52.67	50.00	49.00	50.56
Mridula	185.93	166.80	124.50	159.08	15.07	14.00	13.07	14.04	8.97	8.67	7.23	8.29	61.00	50.33	56.33	55.89
G-5406	195.40	177.50	132.77	168.56	15.27	14.50	13.20	14.32	7.47	7.23	6.47	7.06	58.33	49.67	53.33	53.78
Madhuri	146.10	131.20	125.40	134.23	11.57	10.83	9.87	10.76	5.80	5.53	5.93	5.76	52.33	47.67	48.67	49.56
Mean	177.85	151.00	122.76		13.36	12.64	12.17		7.39	6.89	6.24		53.81	47.29	49.86	
CD at 5%																
Variety				6.42				0.58				0.27				0.60
Season				4.20				0.38				0.18				0.39
Variety × Season				11.12				1.01				0.47				1.03

Table 2. Performance of baby corn varieties for cob characters grown in different seasons of Goa.

Variety	Cob weight (g)				Dehusked cob weight (g)				Ratio of dehusked cob weight to green cob weight				Dehusked cob diameter (cm)				Dehusked cob length (cm)			
	Rabi	Summer	*Kharif*	Mean	*Rabi*	Summer	*Kharif*	Mean	*Rabi*	Summer	*Kharif*	Mean	*Rabi*	Summer	*Kharif*	Mean	*Rabi*	Summer	*Kharif*	Mean
VL-42	61.28	56.74	41.07	53.03	9.44	8.73	7.90	8.69	0.12	0.18	0.14	0.15	1.45	1.40	1.33	1.39	8.87	8.92	8.16	8.65
VLBC-1	47.99	46.90	38.00	44.30	9.61	8.60	7.62	8.61	0.12	0.17	0.16	0.15	1.29	1.30	1.28	1.29	8.08	8.60	7.70	8.13
COBC-1	69.03	59.04	48.34	58.80	8.01	7.45	7.46	7.64	0.10	0.10	0.13	0.11	1.34	1.26	1.26	1.28	8.51	8.27	8.11	8.30
Golden Baby	74.81	70.17	55.09	66.69	9.86	9.37	9.11	9.45	0.10	0.09	0.18	0.12	1.50	1.45	1.38	1.45	9.60	9.46	9.80	9.62
Mridula	76.19	72.20	56.52	68.30	9.74	9.61	8.12	9.16	0.08	0.10	0.10	0.09	1.58	1.41	1.38	1.46	8.15	8.08	8.39	8.21
G-5406	76.86	68.07	57.11	67.35	8.71	8.59	7.99	8.43	0.08	0.10	0.12	0.10	1.35	1.30	1.30	1.31	8.53	8.40	7.39	8.11
Madhuri	55.00	46.87	49.77	50.55	9.54	9.44	8.84	9.28	0.12	0.14	0.15	0.14	1.35	1.27	1.28	1.30	9.67	9.31	9.50	9.50
Mean	65.88	60.00	49.42		9.28	8.83	8.15		0.10	0.13	0.14		1.41	1.34	1.32		8.77	8.72	8.44	
CD at 5%																				
Variety				2.87				0.40		0.01						0.03				0.33
Season				1.88				0.26		0.01						0.02				0.22
Variety × Season				4.98				0.70		0.02						0.05				0.57

Table 3. Cob yield and fodder yield of baby corn varieties grown in different seasons of Goa.

Variety	Cobs/plant				Green cob yield (t/ha)				Dehusked cob yield (t/ha)				Fodder yield (t/ha)			
	Rabi	Summer	*Kharif*	Mean	*Rabi*	Summer	*Kharif*	Mean	*Rabi*	Summer	*Kharif*	Mean	*Rabi*	Summer	*Kharif*	Mean
VL-42	2.97	3.00	2.80	2.92	10.99	10.15	6.88	9.34	1.70	1.58	1.28	1.52	38.57	22.25	14.42	25.08
VLBC-1	3.33	3.07	2.93	3.11	9.53	8.63	6.74	8.30	1.87	1.59	1.33	1.60	34.65	18.53	12.68	21.95
COBC-1	2.93	3.00	2.40	2.78	12.08	10.63	6.93	9.88	1.48	1.37	1.17	1.34	41.01	30.28	20.53	30.60
Golden Baby	3.20	3.13	3.00	3.11	14.28	13.18	9.92	12.46	1.91	1.80	1.66	1.79	51.38	40.82	23.63	38.61
Mridula	2.67	2.97	2.93	2.86	13.04	12.86	9.79	11.90	1.70	1.72	1.47	1.63	60.07	47.56	32.72	46.78
G-5406	3.27	3.00	3.00	3.09	14.92	12.51	10.00	12.48	1.74	1.53	1.48	1.58	43.92	39.33	22.54	35.26
Madhuri	3.07	3.07	2.87	3.00	10.06	8.63	8.57	9.09	1.75	1.73	1.54	1.67	23.84	17.21	12.32	17.79
Mean	3.06	3.03	2.85		12.13	10.94	8.41		1.74	1.62	1.42		41.92	30.85	19.83	
CD at 5%																
Variety				0.17				0.62				0.08				2.06
Season				0.11				0.41				0.05				1.35
Variety × Season				0.29				1.07				0.13				3.57

with each other recorded the highest yield whereas VLBC-1 recorded the lowest yield. The maximum green cob yield was observed during *rabi* in variety G-5406 and the minimum was noticed in VLBC-1 grown in *kharif* season.

Results (Table 3) revealed that maximum dehusked cob yield per hectare was observed in *rabi* season whereas minimum yield was noticed in *kharif* season in all the varieties. The variety Golden Baby yielded the maximum whereas minimum yield per hectare was obtained in COBC-1. Dehusked cob yield recorded in Golden Baby during *rabi* season was maximum whereas it was minimum in COBC-1 grown during *kharif*. In baby corn, fodder which is green, fresh and rich in nutrients fetches good income to grower in addition to cobs. Fodder yield per hectare was significantly more in *rabi* season in all the varieties while in *kharif* there was a reduction in fodder yield by 52.8% as compared to *rabi* season. Irrespective of the seasons, Mridula produced the maximum fodder whereas the minimum was reported in Madhuri. More fodder yield is attributed to better vegetative growth and accumulation of more dry matter. Based on the results, the variety Mridula was rated as the best fodder yielder in all seasons.

There was a wide variation among the varieties and seasons for gross returns, net returns and benefit cost ratio (Table 4). The differences noticed in respect of cost of cultivation among varieties and seasons were attributed to seed cost and irrigation frequency, respectively. Comparatively, less cost of production during the *kharif* season was on account of total rainfed conditions. Among the seasons, the highest net returns and benefit: cost ratio in all the varieties were observed in *rabi* season and this may be due to ideal environmental conditions. The varieties Golden Baby, G-5406 and Mridula being par with one another, provided the higher net returns and benefit : cost ratio. Better economic returns in above varieties were attributed to good cob and fodder yields. Pandey *et al*. (4) reported similar differences among the baby corn varieties.

Studies have proven the successful performance of baby corn under various agro-climatic conditions of Goa. However, the varietal performance was better during *rabi* season as compared to other seasons. Based on results and economics, varieties G-5406, Golden Baby and Mridula were found promising for green cob yield whereas Golden Baby and Madhuri for dehusked cob yield. Among the varieties, Golden Baby was emerged as the best yielder in all the seasons and therefore, it is a right choice for year round cultivation in Goa.

Table 4. Economics of baby corn as influenced by varieties and seasons.

Variety	Cost of cultivation (Rs./ha)				Gross returns (Rs/ha)				Net returns (Rs./ha)				Benefit cost ratio			
	Rabi	Summer	*Kharif*	Mean	*Rabi*	Summer	*Kharif*	Mean	*Rabi*	Summer	*Kharif*	Mean	*Rabi*	Summer	*Kharif*	Mean
VL-42	33,750	34,250	32,750	33,583	77,723	67,566	45,780	63,689	43,306	33,316	13,030	29,884	2.30	1.97	1.40	1.89
VLBC-1	33,750	34,250	32,750	33,583	67,624	57,340	44,416	56,460	33,874	23,090	11,666	22,876	2.00	1.68	1.36	1.68
COBC-1	34,000	34,500	33,000	33,833	84,834	71,870	47,724	68,142	50,834	37,370	14,724	34,309	2.49	2.08	1.45	2.01
Golden Baby	35,020	36,020	34,020	35,020	101,147	91,332	66,885	86,454	66,127	55,313	32,865	51,435	2.89	2.53	1.96	2.46
Mridula	34,500	35,000	33,500	34,333	96,326	91,385	68,582	85,431	61,826	56,385	35,082	51,098	2.79	2.61	2.05	2.48
G-5406	34,400	34,900	33,400	34,233	1,02,798	86,946	66,839	85,527	68,398	52,046	33,439	51,294	2.99	2.49	2.01	2.49
Madhuri	33,750	34,250	32,750	33,583	69,394	57,070	56,059	60,841	35,674	22,820	23,309	27,268	2.06	1.67	1.71	1.81
Mean	34,167	34,738	33,167		85,692	74,787	56,612		51,434	40,048	23,445		2.50	2.15	1.70	
CD at 5%																
Variety												3508				0.11
Season												2296				0.07
Variety × Season												6077				0.18

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