



Performance of *Costus speciosus* Genotypes under Different Agro-Climatic Zones of Chhattisgarh

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Abstract

An investigation was made through multi location trial (MLT) to evaluate the genotypes of *Costus speciosus* locally known as Kewkand under different agro-climatic zones of Chhattisgarh to identify the high rhizome yielding genotype. The experiment was conducted during *Kharif* 2014-15 and 2015-16 at ten locations under Chhattisgarh Northern Hill Region and Bastar Plateau of Chhattisgarh with four genotypes including local check. The locations were the replication in the experiment. The experiment was laid out in Randomized Complete Block Design (RCBD) with four treatments *viz.* IGKK-1, IGKK-3, IGKK-4 and Local check with ten replications *viz.* L₁: Jagdalpur, L₂: Kanker, L₃: Narayanpur, L₄: Dantewada, L₅: Bijapur, L₆: Balrampur, L₇: Jashpur, L₈: Surguja, L₉: Korea & L₁₀: Raigarh. The pooled data of two years revealed that the maximum plant height, number of leaves per plant, early maturity, number of rhizome per plant and average rhizome yield was recorded genotype IGKK-1. Among the four genotypes IGKK-1 gave significantly higher rhizome yield of 24.47 t ha⁻¹. The genotype IGKK-1 is the promising genotype for commercial cultivation in Chhattisgarh.

Key words: *Costus speciosus*, kewkand, maturity, rhizome yield

Introduction

Kewkand, *Costus speciosus* (Koenig) Sm. also known as spiral, crepe or wild ginger belongs to the family Costaceae is a herbaceous and rhizomatous plant (Hindi - Keukand; Tamil - Kostum; Telgu - Cengalva Kostu; Sanskrit - Kuslita, Kashmira, Shura, Pushkarmula, Katar Katar). It has a very wide distribution in India, occurring throughout the sub - Himalayan tract from Himachal Pradesh to Assam, Vindhya and Satpura hills in Central India and the Western Ghats of Maharashtra, Karnataka and Kerala (Sarin *et al.*, 1974). It is widely found in hilly tracts and forest of Chhattisgarh mostly in the Bastar and Bilaspur divisions.

Tuberous rhizome of kewkand is used as vegetable, as medicine and in the preparation of value added products

like pickle, *Badi* and *chatni* by the local people of Chhattisgarh. The rhizomes after grinding are commonly used as medicine for treatment of diarrhea. They are an important source of diosgenin and are used in many human and veterinary medicines (Sarin, 1974). It has purgative and tonic properties. The roots are used as tonic and anthelmintic in Uttar Pradesh. The rhizomes contain dry matter (16.40%), starch (10.48%) and sugar (1.30%) (Vimala and Nambisan, 2005). Kewkand is also used to control diabetes and traditionally diabetic people eat one leaf daily to keep their blood glucose level low (Marina, 2004).

The plant is rich in protein, iron and antioxidant components such as ascorbic acid, α -tocopherol and β -carotene (Vishalakshi and Urooj, 2010). *C. speciosus*

alkaloids have been shown to possess anti-cholinesterase activity both *in vitro* and *in vivo* (Battacharya *et al.*, 1972). An aqueous extract of *C. speciosus* showed significant hypoglycemic effects when it was administered orally with a simultaneous glucose load (Mosihuzzaman *et al.*, 1994). However, information regarding growth and flowering parameters of kewkand germplasm is lacking. Looking to the diverse availability of this crop in Chhattisgarh, the present investigation was carried out to study the growth and yield performance of different genotypes of the species and for better exploitation of this underutilized crop.

Material and Methods

The study was conducted to evaluate the genotype of *Costus speciosus* locally known as kewkand under different agro-climatic zones of Chhattisgarh to identify the high rhizome yielding genotype. The experiment was conducted during Kharif 2014-15 & 2015-16 at ten locations under Chhattisgarh Northern Hill Region and Bastar Plateau of Chhattisgarh with four genotypes including the local check. The locations were treated as the replication in the experiment. The experiment was laid out in Randomized Complete Block Design (RCBD) with four treatments *viz.*, IGKK-1, IGKK-3, IGKK-4 and Bastar local

check with ten replications *viz.*, L₁: Jagdalpur, L₂: Kanker, L₃: Narayanpur, L₄: Dantewada, L₅: Bijapur, L₆: Balrampur, L₇: Jashpur, L₈: Surguja, L₉: Korea & L₁₀: Raigarh, in an individual plot size 4.5 × 4.5 m. Seed rhizomes were planted at 90 × 90 cm spacing in the month of June and the rhizomes were harvested in last week of November. One earthing up, two hand weeding and intercultural operations were done during the crop growth period. FYM @ 300 q ha⁻¹ was applied during field preparation and nitrogen, phosphorus and potash (35, 25 and 50 kg ha⁻¹, respectively) was given before planting and 15 kg nitrogen was applied during earthing up at 40-45 days after planting. Morphological characters such as plant height, number of leaves per plant, days to maturity, number of rhizome per plant and total rhizome yield (t ha⁻¹) were recorded.

Results and Discussion

The pooled data of two years on yield performance of the kewkand genotype are furnished in Table 1 and 2 and mean performance on the basis of two year data also given in Table 3. The plant height varied from 129.56 to 169.44 cm. The tallest plant (169.44 cm) was recorded for IGKK-1, which was significantly superior to other

Table 1. Growth and yield performance of kewkand entries (2014-15)

Sl. No.	Name of genotypes	Plant height (cm)	Number of leaves	Maturity (in days)	Number of rhizomes plant ⁻¹	Rhizome yield (t. ha ⁻¹)
1.	IGKK-1	158.29	277.50	167.40	28.40	24.57
2.	IGKK-3	133.45	225.70	173.20	17.80	19.27
3.	IGKK-4	137.45	176.10	175.10	20.60	22.15
4.	Local Check (Bastar Local)	127.28	145.10	179.60	11.80	13.93
	SEm ±	1.138	1.883	0.620	0.703	0.623
	CD at 5 %	3.320	5.493	1.810	2.051	8.818
	CV %	2.587	2.889	1.128	11.312	9.863

Table 2. Growth and yield performance of kewkand entries (2015-16)

Sl. No.	Name of genotypes	Plant height (cm)	Number of leaves	Maturity (in days)	Number of rhizomes plant ⁻¹	Rhizome yield (t. ha ⁻¹)
1.	IGKK-1	180.59	310.60	168.60	32.20	24.36
2.	IGKK-3	144.49	187.10	176.60	20.40	18.69
3.	IGKK-4	166.76	244.50	173.20	25.40	21.53
4.	Local Check (Bastar Local)	131.83	148.40	181.00	12.60	14.06
	SEm ±	1.010	4.714	0.793	0.612	0.653
	CD at 5 %	2.945	13.753	2.155	1.786	1.905
	CV %	2.047	6.696	1.336	8.548	10.503

genotype, whereas, shortest plants (129.56 cm) was recorded in Bastar Local. The number of leaves ranges from 146.75 to 294.05 as per mean performance of two year data. The maximum number of leaves per plant (294.05) was recorded in entry IGKK-1 which was significantly superior over the other genotype and minimum number of leaves per plant (146.75) was recorded in Bastar Local. The difference observed in the vegetative characters may be due to the genetic variation of the entries. The height of the plants varied significantly between genotypes and it might be due to genetic makeup of plant genotype which express their own characters at different locations of the experiment which was also reported by Latha *et al.* (1994), Patil (1995), Naidu *et al.* (2000), Srivastava and Singh (2003) in turmeric. Days to maturity ranges from 168 to 181 days and observed among the entries in IGKK-1(168 days) which was superior to other genotype. Late maturity was observed in Bastar local. Number of rhizome per plant ranges from 12.20 to 30.30. Highest number of rhizomes per plant (30.30) was noticed in the entry IGKK-1 which was statistically superior to all other entries. Similar findings

were given by Pathania *et al.* (1981), Sinker *et al.* (2005) and Chaudhary *et al.* (2006) in turmeric. The pooled data of two years revealed that the average yield of *Costus speciosus* was in the ranges from 14.00 to 24.47 t ha⁻¹. Among the four genotypes IGKK-1 gave significantly higher rhizome yield (24.47 t ha⁻¹) followed by IGKK-4 (21.84 t ha⁻¹) which were significantly superior to rest of the genotypes (Fig. 1). The genotype IGKK-1 is considered as the promising genotype for commercial cultivation in Chhattisgarh. The present findings are in line with the reports of earlier workers (Anonymous, 2006). The variation in the yield parameters may be due to the potential of the genotypes to express differently due to variation in soil and climatic conditions of the area of collection (Chongtham *et al.*, 2013), apart from the genetic variation.

Conclusion

The genotypes IGKK-1 observed for the early maturity and highest rhizome yielder t ha⁻¹ at all the locations evaluated under multi location trial as well as mean performance under growth and yield attributing characters



Fig.1. IGKK-1 high yielding genotype of Kewkand under MLT

IGKK-4

Table 3. Mean performance of kewkand entries (2014-15 & 2015-16)

Sl. No.	Name of genotypes	Plant height (cm)	Number of leaves	Maturity (in days)	Number of rhizomes plant ⁻¹	Rhizome yield (t. ha ⁻¹)
1.	IGKK-1	169.44	294.05	168.00	30.30	24.47
2.	IGKK-3	138.97	206.40	174.90	19.10	18.98
3.	IGKK-4	152.11	210.30	174.15	23.00	21.84
4.	Local Check (Bastar Local)	129.56	146.75	180.30	12.20	14.00
	General Mean	147.52	214.38	174.34	21.15	19.82
	Range	129.56 -169.44	146.75 -294.05	168.00 -180.83	12.20 -30.30	14.00 -24.47
	SEm±	1.07	3.30	0.71	0.66	0.64
	CD at 5 %	3.13	9.62	1.98	1.92	5.36
	CV %	2.32	4.79	1.23	9.93	10.18

of plant and rhizome as compare to local check. It may thus be concluded that, genotype IGKK-1 is a promising genotype and it may be exploited further for commercial cultivation in Chhattisgarh.

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