

## Assessment of Quality Characteristics of Mango Ginger (*Curcuma amada* Roxb.) Germplasm

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### Abstract

Mango ginger (*Curcuma amada* Roxb.) is popular in southern and eastern India mainly due to its typical pleasant flavor. It has carminative, stomachic properties. The rhizome is used for treatment of inflammatory conditions. Its essential oil has antifungal properties. Mango ginger finds an extensive application in the preparation of sweet meat and pickles because of its exotic mango aroma. It is also used for preparing preserves, candies, salads, sauces, chutney, etc. Nine germplasm namely Pundibari Col-1, Pundibari Col-2, Daspur, Krishnanagar Col-1, Krishnanagar Col-2, Kesinga, Sargiguda, Brahmapur, Cochin were assessed for their qualitative characters (curcumin, oleoresin, crude protein, total sugar and starch). Maximum fresh rhizome yield ha<sup>-1</sup> was found to be highest (57.45 t) with Krishnanagar Col-2. Quality estimation indicated maximum oleoresin (6.57%), curcumin (0.43%) and total sugar (5.24%) in Kesinga germplasm while higher starch concentration (45.46%) and maximum crude protein (7.85%) were recorded with Daspur and Pundibari Col-2, respectively. The mango ginger, a potential crop with huge medicinal properties is totally unexploited. Hence, for its proper utilization it is essential to encourage its cultivation in the areas where it can be suitably grown. A grower may therefore select germplasm for cultivation according to specific purpose.

### 1. Introduction

Mango ginger (*Curcuma amada* Roxb) is a perennial herb but cultivated as an annual crop mostly in India and Malaysia. The rhizomes of *Curcuma amada* are called "Amada" in Bengali because of the characteristics odor, and hence they are popularly known as Mango ginger. Mango ginger is popular in southern and eastern India mainly due to its typical pleasant flavor. It has carminative, stomachic properties (Hussain et al., 1992). The rhizome is used for treatment of inflammatory conditions. Its essential oil has antifungal properties. It comes under Zingiberaceae family, under-exploited and lesser known spice crop, used in the manufacture of pickles, medicines, sweet meats and chutneys because of its exotic mango aroma (Gholap and Bandyopadhyay, 1984). It is also used for preparing preserves, candies, salads, sauces, chutney etc. Twenty eight constituents were identified from the rhizome essential oil of *Curcuma amada* of which curcumene (28.1%), beta-curcumene (11.2%), curzerone (7.15%) and 1-8 cineole (6%) were found as the major compounds (Srivastava et al., 2001). The pale yellow color of mango ginger is due to curcumin (diferuloyl methane) and the content ranges from 0.1 to 0.25%. The quality of mango

ginger is mainly determined by its volatile oil, non-volatile ether extract, fiber, starch, sugar and protein contents. The oil was primarily composed of terpene hydrocarbons, tentatively identified as alpha-pinene, car-3-ene and cis-ocimene; the last 2 compounds were responsible for the characteristic odor of raw mango. So, there is a vast scope for improvement of this valuable spice crop. Introduction of high yielding varieties with proper package of practices will help to achieve high yield and better quality.

### 2. Materials and Methods

The research was conducted at the Horticultural Research Farm during the year 2003-04 at Mondouri (Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, West Bengal, India). The experiment was laid out in randomized block design with three replications and evaluation was done on nine mango ginger germplasms, viz. Pundibari Col.-1 and Pundibari Col.-2 obtained from Coochbeher, West Bengal; Daspur obtained from Midnapur, West Bengal; Krishnagar Col.-1 and Krishnagar Col.-2 obtained from Nadia, West Bengal; Kesinga and Sargiguda obtained from Kalahandi, Orissa; Bramhapur obtained

from Cuttack, Orissa and Cochin obtained from Cochin, Kerela. Planting of rhizomes was done on 6<sup>th</sup> May 2003 with a spacing of 30 x 25 cm<sup>2</sup>. Observations were recorded on qualitative characters like curcumin content, oleoresin content, crude protein content, total sugar and starch contents. The data recorded from the field experiment were subjected to statistical analysis appropriate to RBD (Gomez and Gomez, 1984). The significant of different sources of variation was tested by Error Mean Square by Fishers Snedecor's 'F' test at probability levels 0.05 for appropriate of freedom. For determination of standard error of Mean (SEM $\pm$ ) and the value of the critical difference (CD) between the treatments mean at 5% level of significance.

### 3. Results and Discussion

#### 3.1. Curcumin content

Among the nine different germplasms of *Curcuma amada*, germplasm Kesinga produced maximum (0.43%) curcumin content, followed by Cochin (0.41%), Sargiguda (0.39%), Pundibari Col.-2 (0.37%) and Bramhapur (0.37%). While curcumin content was recorded minimum in case of Pundibari Col.-1 (0.22%) followed by Krishnagar Col.-1 (0.29%) (Table 1).

#### 3.2. Oleoresin content

Maximum oleoresin content was recorded from the germplasm Kesinga (6.57%), followed by germplasm Sargiguda (6.32%) and Bramhapur (5.93%) while minimum oleoresin content was recorded from the germplasm Krishnagar Col.-1 (4.21%) followed by Cochin (4.77%) and Pundibari Col. 2 (4.83%) (Table 1).

#### 3.3. Total sugar content

Table 1: Fresh yield ha<sup>-1</sup>, curcumin and oleoresin content of different germplasm of *Curcuma amada* Roxb.

Germplasm	Fresh yield ha <sup>-1</sup> (t)	Curcumin (%)	Oleoresin (%)
Pundibari Col.-1	32.80	0.22	5.11
Pundibari Col.-2	55.53	0.37	4.85
Dasapur	37.54	0.31	5.17
Krishnagar Col.-1	34.50	0.29	4.21
Krishnagar Col.-2	57.45	0.32	5.49
Kesinga	39.57	0.43	6.57
Sargiguda	54.18	0.39	6.32
Bramhapur	49.44	0.37	5.93
Cochin	44.58	0.41	4.77
SEM $\pm$	0.17	0.03	0.04
CD ( $p=0.05$ )	0.52	0.08	0.11

Total sugar content of different *Curcuma amada* germplasms are presented in Table 2. Maximum total sugar content was recorded in the germplasm Kesinga (5.24%), while minimum was recorded in Sargiguda germplasm (3.53%). Significant variation was noticed among nine germplasms under investigation.

#### 3.4. Total starch content

There was a significant difference among the different germplasms of *Curcuma amada* with regards to total starch content (Table 2). Maximum total sugar content (45.46%) was found in Dasapur, which was statistically at par with Cochin (44.53%) and Pundibari Col.-1 (44.30%) germplasm.

#### 3.5. Crude protein content

It is evident from the Table 2 that crude protein content was maximum (7.85%) with germplasm Pundibari Col.-1. followed by Bramhapur (7.56%) and Krishnagar Col.-2 (7.25%). On the other hand, crude protein content was recorded minimum (5.37%) with Kesinga germplasm.

The result in general indicates that the germplasm of South Bengal performed better compared to germplasm from other sources like North Bengal, Orissa and Kerela. It proves that the germplasm from other sources need more time for acclimatization in South Bengal condition and then only the germplasm would be able to express their fullest potential. Some of the variations may be due to different genetic make-up and need to be identified for better understanding. Majority of North Bengal germplasm, viz. Pundibari Col.-1 and Pundibari Col.-2 proved superior with respect to quality parameters like curcumin, oleoresin, total sugar, total starch and crude protein. While the South Bengal germplasm, viz. Dasapur, Krishnagar Col.-1 and Krishnagar Col.-2 could not produce rhizome with better quality.

Table 2: Total sugar, total starch and crude protein contents of different germplasm of *Curcuma amada* Roxb.

Germplasm	Total sugar (%)	Total starch (%)	Crude protein (%)
Pundibari Col.-1	4.10	44.30	7.85
Pundibari Col.-2	3.85	39.26	6.36
Dasapur	4.30	45.46	6.15
Krishnagar Col.-1	4.25	44.20	6.84
Krishnagar Col.-2	4.45	44.10	7.25
Kesinga	5.24	41.60	5.37
Sargiguda	3.53	42.10	7.44
Bramhapur	3.66	42.23	7.56
Cochin	4.19	44.53	6.96
SEM $\pm$	0.01	0.41	0.02
CD ( $p=0.05$ )	0.03	1.21	0.05

#### 4. Conclusion

Mango ginger germplasms showed a distinct variation among themselves with regard to curcumin, oleoresin, total sugar, starch and crude protein content. Among different germplasm, significant highest curcumin content was noted in Kesinga (0.43%) and lowest in Pundibari Col.-1 (0.22%). On the other hand, maximum oleoresin content was recorded in germplasm Kesinga (6.57%) and minimum in Krishnagar Col.-1 (4.21%). The investigation revealed that the germplasm had significant variation among themselves with regard to crude protein content and total starch content. The highest crude protein content was recorded in Pundibari Col.-1 (7.85%) and lowest in Kesinga (5.37%), whereas total sugar and starch content was recorded highest (5.24%) in Kesinga and minimum (3.53%) in Sargiguda and Pundibari Col.-2 (39.26%). The mango ginger, a potential crop with huge medicinal properties is totally unexploited. Hence, for its proper utilization it is essential to

encourage its cultivation in the areas where it can be suitably grown. A grower may therefore select germplasm for cultivation according to specific purpose.

#### 5. References

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