



Assessment of Yield Parameters in Sweet Flag (*Acorus calamus* L.) Germplasm Under Northern Dry Zone of Karnataka

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ABSTRACT

*The present investigation was carried out to evaluate the mean performances of sweet flag (*Acorus calamus* L.) accessions collected from different parts of India. The experiment was conducted at the College of Horticulture, Munirabad, Karnataka. A total of ten sweet flag accessions were evaluated with three replications in a Randomized Complete Block Design. Significant variation was observed among all the accessions with respect to growth, yield and yield-attributing characters. The mean performance of accessions for yield attributing characters revealed that accession SF6 - Hosur village (Vijayanagara) performed well among the ten accessions which recorded maximum fresh weight of rhizomes (29.16 q/ha), dry weight of rhizomes (15.63 q/ha), dry recovery (46.94 %) and maximum oil content (6.10 %). Hence, the Hosur village collection can be recommended for commercial cultivation in Karnataka and can also be utilized in further breeding programmes.*

Keywords: Sweet Flag, Germplasm, Yield Parameters, Northern Dry Zone

1. INTRODUCTION

A semiaquatic perennial herb, *Acorus calamus* is a popular medicinal plant commonly known as sweet flag (Bacha), belongs to the family Acoraceae. The crop is mainly grown for its scented leaves and rhizomes which have been traditionally used as a medicine. The leaves have sword shape and are yellowish green in color. The plant grows up to one meter from the ground. Flowers are cylindrical in shape and are greenish brown in color. The plant changes from pale green to pink as it matures. The leaf scars are brown, white, and spongy. The plant possesses slender roots, and its leaves are few and distichously alternate.

It is indigenous to central Asia, India, and mainly cultivated in the Netherlands, Persia, United Kingdom, India and Sri Lanka. It is common on the banks of streams and in damp marshy places in Kashmir and the Kumayun region of Himalayas. However, it is cultivated in Karnataka, Kashmir, Assam, Manipur and Nagaland also. The rhizome is the source of an essential oil, which is a unique source of oxygenated sesquiterpenes of great structural variety and responsible for significant antibacterial, antifungal, and insecticidal properties (Imam et al., 2013). Calamus was valued as a stimulant, bitter herb for the appetite and as an aid to the digestion. In North America, the decoction is used for fevers, stomach cramps and colic; the rhizomes are chewed for toothache and powdered rhizome can be inhaled for congestion. In Ayurvedic medicine Calamus is valued as a "rejuvenator" for the brain and nervous system, and as a remedy for digestive disorders (Balakumbhan et. al., 2010).

Due to its growing medicinal use, it is being rapidly extracted from wild. The rhizome is found to be a powerful aphrodisiac having Asarone as major alkaloid constituent. The rhizomes of the plant are used as sedative, stomachic, aromatic, insecticidal, anti-inflammatory, aphrodisiac, antipyretic, insecticidal, and carminative. Sweet flag is one of the potential medicinal crops with its wide spectrum of uses. The crop is enlisted under red list of IUCN and need to be conserved. Crop is hardy and well suited to marshy lands prevailing in this area. So with a view to commercialize cultivation in Koppal district, and to evaluate the performance of different collections and to conserve the germplasm, the following experiment is taken.

2. MATERIALS AND METHODS

The experiment was conducted at the instructional farm of College of Horticulture, Munirabad under UHS Bagalkot, Karnataka. Objectives of the study are to evaluate sweet flag germplasm from various sources and identification of collections suitable for Northern -Dry Zone of Karnataka.

The crop was grown under irrigated condition. The total amount of rainfall received was 323.21 cm during the period of implementation of the experiment. The experiment was laid out in Randomized Complete Block Design with three replications. The soil was sandy-loam and coarse with poor water-holding capacity and the climate was tropical.

Rhizome bits of 5 cm with growing tops were transplanted in the field in a plot of 1.50 m x 1.50 m size with a spacing of 30 cm x 30 cm. The crop was transplanted during the third week of March and harvested during the 3rd week of February. The crop was given recommended package of practices. Farm yard manure will be uniformly (@ 10t ha⁻¹ applied at the time of field preparation. Crop will be fertilized with nitrogen, phosphorus, and potassium in ratio of 25:50:60 kg ha⁻¹.

Observations on various yield characters were recorded twice, from five randomly selected plants in each replication (excluding the border row) at 180 days after transplanting and at harvest, respectively. Yield-attributing characters recorded are rhizome fresh weight (q/ha), Rhizome dry weight (q/ha), Dry recovery (%) and Oil content (%). Dry-recovery percentage was taken as dryweight over fresh-weight of rhizomes. Statistical analysis was done as per Gomez and Gomez (1984).

The Germplasms collected are 1. Gangavati – 1, 2. Gangavati - 2, 3. Koratagere 4. Arabhavi 5. Hampi village 6. Hosur village 7. Kappathgudda 8. Bagalkot 9. Bidar and 10. Pune.

Table: yield parameters in Sweet flag (*Acorus calamus L.*) germplasm collections

Sl no	Genotypes	Fresh yield (q/ha)	dry yield (q/ha)	dry recovery (%)	oil content (%)
1	SF-1	22.20	10.37	40.75	3.30
2	SF-2	19.09	08.95	45.27	2.60
3	SF-3	25.64	11.11	50.28	5.20
4	SF-4	20.65	10.67	51.92	5.70
5	SF-5	22.97	10.35	43.66	3.80
6	SF-6	29.16	15.63	54.12	6.10
7	SF-7	23.42	11.02	46.94	3.30
8	SF-8	18.76	07.33	41.71	3.60
9	SF-9	21.48	09.44	41.57	3.40
10	SF-10	24.09	11.44	45.00	4.10
	CD @5%	2.50	03.02	03.86	1.20
	SEM	0.84	01.01	01.30	0.40

Note: SF1 - Gangavati – 1 ; SF-2 - Gangavati - 2 ; SF -3 - Koratagere 4 - Kappathgudda-1 ; SF5 - Kappathgudda-2 SF6 -Hosur village ; SF7 - Hampi village ; SF8 - Arabhavi SF9 – Sandur; SF10 - Pune.

3. RESULTS AND DISCUSSIONS

Rhizome fresh weight (q/ha)

The fresh weight of rhizomes per hectare was ranged from 18.76 q to 29.16 q/ha (Table). The maximum fresh weight of rhizomes per hectare was recorded in Hosur village collection (29.16 q), followed by Koratagere (25.64 q) and Pune (MH) (24.09 q) and Kappathgudda (20.65 q). The least fresh weight of rhizomes per hectare was observed in Arabhavi - 18.76 q. The variation in the root yield may be due to variations in the genetic makeup of genotypes. Similar results were obtained by Bhutia et al. (2024) and Kasture et al., (2015) in sweet flag.

Rhizome dry weight (q/ha)

The dry weight of rhizomes per hectare was maximum in Hosur village (15.63 q), and was on par with Pune (11.44 q), followed by Koratagere (11.11 q). The minimum dry weight of rhizomes per hectare was observed in Arabhavi (7.33 q). The variation in the root yield may be due to variations in the genetic makeup and growth parameters of genotypes. Similar results were obtained by Chaudhary et al., (2016) in ashwagandha.

Dry recovery (%)

Lot of variation has been observed in dry recovery of sweet flag. Maximum dry recovery has been observed in ranged from 40.75 % to 46.94 % (Table). The maximum dry recovery of rhizomes per hectare was recorded in Hosur village (46.94 %), and was on par with Kappath gudda-1 (51.92) and Koratagere (50.28 %), followed by the minimum dry recovery of rhizomes per hectare was observed in Gangavati – 1 (40.75 %) (Madhuri et al., 2022 and Mythili A et al., 2006).

Oil content (%)

Maximum oil content has been observed in ranged from 6.10 % to 1.60 % (Table). The maximum oil content of rhizomes per hectare was recorded in Hosur village (6.10 %), and was on par with Kappath gudda-1 (5.70 %) and Koratagere (5.20 %), followed by The minimum oil content of rhizomes per hectare was observed in Gangavati – 2 (2.60 %) (Madhuri et al., 2022)

The variations in genotypes reproductive development, which affect rhizome yield through regulating photosynthesis. The yield of rhizomes and dry recovery are greatly influenced by environmental factors like soil and climate. Mythili et al., (2006) in sweet flag and Patel and Desai (2017) reported similar results in Ashwagandha. Studies of Aparna et al., 2020, in sweet flag also support the findings.

4. CONCLUSION

Based on our findings, it was found that collection SF6 -Hosur village (Ballari) performed good in terms of growth, yield and yield attributing parameters followed by Pune (MH) and Koratagere (Tumkur). Hence these three accessions can be recommended for commercial cultivation in Northern dry zone of Karnataka and can be further utilized in the breeding programmes.

5. FUTURE SCOPE

The accessions which are performing best can be recommended for commercial cultivation in Karnataka and can be further utilized in the breeding programmes.

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