

Variety registration report:

Registration of a cold tolerant, high biomass and centellosides yielding variety: CIM Medha of Mandukparni (*Centella asiatica* (L))

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ABSTRACT

Centella asiatica (Mandukparni) is a herbaceous creeping plant of the family Apiaceae. Native to India and Sri Lanka the herb is being used for centuries in traditional Chinese and Indian systems of medicine for boosting mental agility and wound healing in burn patients. It is also being used in several herbal formulations for treating high blood pressure, rheumatism, fever, mental stress, leprosy, bronchitis, asthma and syphilis. In Ayurvedic system, the herb is mainly used as a nervine tonic for relieving nervous anxiety and stress. Various bioactivities associated with this herb are ascribed to the presence of several triterpenoid sapogenins (centellosides) present in the leaves of this plant. Asiaticosides, madecassosides, asiatic acid and madecassic acid are the major bioactive compounds of this centelloside family. Till date, there is no variety available as standardized reference material for *C. asiatica*. Breeding and selection processes have been carried out at CSIR-CIMAP, Lucknow to develop a strain (CIM-RK-1) with high herb and centelloside yields for commercial cultivation. CIM-RK-1 now christened as CIM-Medha as a new variety has consistently recorded higher biomass and content of centellosides in leaves in field evaluation trials. The potential dry herb yield of this new variety is 11.29ql/ha with 5.36% asiaticoside content in leaves. CIM-Medha is ideally suited for cultivation in northern Indian plains as well as southern regions of the country. The unique purple tinge in centre of leaves and a very high survival rate during winter season due to cold tolerance are the two main distinctive features of this variety.

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INTRODUCTION:

Mandukparni (*Centella asiatica*) is a small herbaceous creeping plant of the family Apiaceae

that is native of India/Sri Lanka. *Centella asiatica* has been used for centuries in both traditional Chinese and Indian systems of medicine. for boosting mental activity and for helping a variety of systemic illnesses, such as high blood pressure, rheumatism, fever, and nervous disorders. In traditional African system of medicine it has been

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Table 1. Mean performance of selected genotypes of Mandukparni in IET

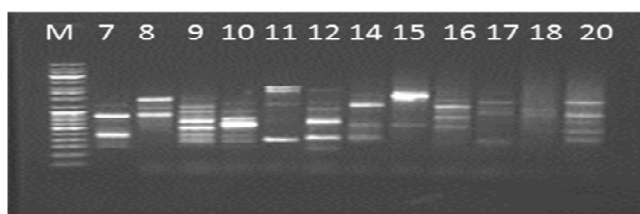
S. No.	Entries	Places of collection	IET ** (Entries = 8, RBD, Reps-5, Plot = 1 m ²)			Availability
			Fresh herb yield (Kg/plot)	Dry herb yield (Kg/plot)	Asiaticoside (mg/g dry wt)	
1.	RK-1	Champavat (Uttanchal)	1.755	0.34	43.2	Through-out the year
2.	RK-2	Gauhati (Assam)	1.15	0.21	23.0	Dormant in winter
3.	CA-3	Mohan Lal Ganj (U.P.)	0.60	0.11	13.5	„
4.	CA-4	Shilang (Meghalay)	1.09	0.20	15.5	„
5.	CA-5	Barabanki (U.P.)	0.92	0.18	10.0	„
6.	CA-6	Khozekhode (Kerala)	0.81	0.15	12.3	„
7.	CA-7	Dehradoon (Uttanchal)	1.12	0.20	11.5	„
8.	Local	Asthi, Lucknow (U.P.)	0.67	0.13	8.6	„
	CD 5%		0.160	0.31	4.5	
	CD 1%		0.216	0.42	6.4	

**=P<0.01

used for the treatment of leprosy, bronchitis, asthma, syphilis and burn wound healing. In India for the last 3,000 years of Ayurvedic medicine, it has been used for the purposes like boosting memory, wound healing, a mild diuretic, alertness, as well as anti-anxiety and anti-stress (Dora and Khatri, 2011). The isolated glycosidal saponins from the plant have been used to treat leprosy and revitalize the brain and nervous system.

**Fig. 1: Field view of variety CIM Medha of Mandukparni (*Centella asiatica*)**

Keeping in mind the importance of *Centella*, breeding efforts were initiated at CSIR-CIMAP. They are briefly summarized below to develop a strain with better plant type and quality.

**Fig. 2: *Centella asiatica* (variety CIM Medha) ISSR profiling*****Centella asiatica* (variety CIM Medha) ISSR Primer Details:**

M- Medium range DNA Ruler

UBC 807- 5'-AGA GAG AGA GAG AGA GT-3'

UBC 808- 5'-AGA GAG AGA GAG AGA GC-3'

UBC 809- 5' -AGA GAG AGA GAG AGA GG-3'

UBC 810- 5'-GAG AGA GAG AGA GAG AT-3'

UBC 811- 5'-GAG AGA GAG AGA GAG AC-3'

UBC 812- 5'-GAG AGA GAG AGA GAG AA-3'

UBC 814- 5'-CTC TCT CTC TCT CTC TA-3'

UBC 815- 5'-CTC TCT CTC TCT CTC TG-3'

UBC 817- 5'-CAC ACA CAC ACA CAC AA-3'

UBC 818- 5'-CAC ACA CAC ACA CAC AG-3'

UBC 819- 5'-GTG TGT GTG TGT GTG TA-3'

UBC 820- 5'-GTG TGT GTG TGT GTG TC-3'

Origin of the variety:

Under the genetic enhancement programme of Mandukparni (*Centella asiatica*), using clonal selection methods, ten collections were primarily screened for high fresh and dry herb yield v/s local check in the year 2005-2006. Out of these selection

Table 2: Mean performance of selected genotypes of Mandukparni in Bench Scale Trial (BST)

S. No.	Entries	BST (Entries=8, RBD, Reps-10, Plot= 4.00m ²)**						Availability
		Fresh herb yield (Kg/plot)	Dry herb yield (Kg/plot)	Asiaticoside (mg/g dry wt)	Madecassoside (mg/g dry wt)	Mad. Acid (mg/g dry wt)	Asiatic acid (mg/g dry wt)	
1.	RK-1	3.56	0.74	52.62	15.30	4.54	2.04	Through-out the year
2.	RK-2	1.25	0.24	21.66	11.18	0.74	0.70	Dormant in winter
3.	CA-3	0.83	0.17	38.32	4.12	0.75	0.41	"
4.	CA-4	1.30	0.25	12.63	1.00	0.49	0.14	"
5.	CA-5	1.43	0.27	11.55	1.00	0.23	2.86	"
6.	CA-6	1.14	0.21	10.42	1.38	0.19	0.89	"
7.	CA-7	1.03	0.20	11.84	1.52	0.18	1.90	"
8.	Check	0.80	0.16	9.68	0.44	0.21	0.13	"
	CD _{5%}	0.35	0.071	3.19	0.56	0.20	0.46	
	CD _{1%}	0.46	0.094	4.31	0.76	0.27	0.63	

**= P<0.01; Date of planting= 22-6-2007

Table 3. Mean performance of selected genotype of Mandukparni in Pilot Scale Trial (PST) (Entries=3, Plot= 35 m²).

S. No.	Entries	Herb yield (Kg/plot)	Dry herb yield (kg/ha)	Herb yield (ql/ha)	Dry herb yield (ql/ha)	Asiatic oside (mg/g dry wt)	Madecasoside (mg/g dry wt)	Mad. Acid (mg/g dry wt)	Asiatic acid (mg/g dry wt)	Availability
1.	RK-1	35.55	3.95	101.57	11.29	50.36	14.20	4.35	2.10	Through-out the year
2.	RK-2	12.50	1.79	35.714	5.11	20.55	10.50	0.68	0.65	Dormant in winter
8.	Check	10.00	1.43	28.571	4.09	10.27	0.43	0.20	0.10	Dormant in winter



Fig. 3: Field view of Local check of Mandukparni (*Centella asiatica*)

seven best entries were screened (Table-1) and put to evaluation in BST, PST testing (Table-2, 3) Then these seven selections (RK-1, RK-2, CA3, CA4, CA5, CA6 and CA-7) were evaluated in Initial

evaluation trial {IET, entries 8 (7 + one Check), RBD, replications 5, plot size = 1.00 m²} in the year 2006-2007 followed by Bench Scale trial {Entries = 8 (7 + one Check), RBD, Reps-10, Plot size =

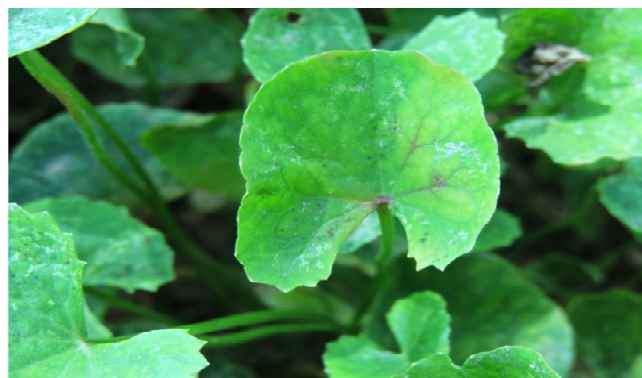


Fig. 4: Variety CIM medha leaf showing purple brown colour tinge in the center of Mandukparni (*Centella asiatica*)

Table 4. Description of the strain/variety

Attributes	CIM- Medha	Check
Growth habit	Creeping and very fast growing	Creeping and slow growing
Leaf	Broad and dark green	Small and light yellow
Stem colour	light green	Yellowish green
Fresh herb yield (ql/ha)	101.57	28.57
Dry herb yield (ql/ha)	11.29	4.08
Asiaticoside content (mg/g dry weight)	50.36	10.27
Madecassoside (mg/g dry weight)	14.20	0.43
Mad. Acid (mg/g dry weight)	4.35	0.20
Asiatic acid (mg/g dry weight)	2.10	0.10
Enhancement capacity /availability	Whole year/cold tolerant	Dormant in winters

**Fig. 5: Variation in leaves of different accessions of *Centella asiatica***

4m²) in the year 2007-08 followed by large Scale Trial (PST, Entries = 3 (2 + one Check), plot size 35m²) during 2008-09 for herb yield (fresh and dry) with better quality (Table 1-3, Figs. 1-3) The top highest yielder genotype RK-1 that maintained its superiority over check for high fresh and dry herb yield 101.57 and 11.29 ql/ha v/s check 28.571 and 4.08 ql/ha, with high asiaticoside -50.36 v/s check 10.27 (mg/g dry wt) is released as a new variety.

Statement of distinction/ Breeder's claims:

Variety CIM – Medha is a highly vigorous, dark green broad size leaves with brown tingeing in

centre. The petiole colour of the leaf is light purple (Table 4, Fig. 14). The stolen colour is also light purple; this strain is winter tolerant and grows in all seasons. These are the distinguishing morphological features of this strain for DUS cataloging.

Recommended cultivation schedules for the strain of CIM Medha

Year of development: 2005-2015

Year of release: 2015 (26-9-2015)

Amount of planting material available: 50.00 Kg fresh stolen/plants

Date of planting : Jan last week of July 1st week

Date of harvest : After 3 months & planting

Fertilizer dosages : 30 kg N, 15 kg Potash, 15 trolley FYM per hectare

REFERENCE

Dora B, Khatri J. 2011. *Centella asiatica*: The elixir of life. IJRAP, 2: 431-438.