

Pushkarmool (*Inula racemosa* Hook. f.) Variety 'Him Pushkarmool' (CSIR-IHBT-IR-09)

Introduction

Inula racemosa commonly known as Pushkarmool (Mannu), is a high-value perennial medicinal plant belonging to the Asteraceae family. It is naturally distributed in the temperate and sub-alpine regions of the Himalayas ranging from Afghanistan to Central Nepal and Kashmir to Kumaon at an altitude of 2700-3500 m above mean sea level. This perennial herb exhibits robust growth, growing to a height of about 150-170 cm. The roots of Pushkarmool are extensively used in traditional Ayurvedic formulations for the treatment of asthma, bronchitis, cardiac disorders, inflammation and gastric ailments.



Uses

The therapeutic properties of Pushkarmool are primarily attributed to the presence of important sesquiterpene *viz.*, **alantolactone** and **isoalantolactone**, key bioactive marker **extracted from roots** for pharmaceutical preparations. Pushkarmool exhibit anti-inflammatory, analgesic, hepatoprotective, antiasthmatic, antimicrobial and antioxidant effect.

'Him Pushkarmool' (CSIR-IHBT-IR-09)

The variety Him Pushkarmool has been developed by CSIR-Institute of Himalayan Bioresource Technology, Palampur through systematic single plant selection approach. The genotype CSIR-IHBT-IR-09 was selected for its significantly higher root biomass, enhanced essential oil content and stable performance across four diverse environments of the Western Himalayan region. The variety has high root biomass (553.39 g per plant), essential oil content (3393.21 mg/kg) and superior concentration of marker compounds *viz.*, alantolactone (51.10-54.60%) and isoalantolactone (21.50-25.80%) compared to the population mean across environments.

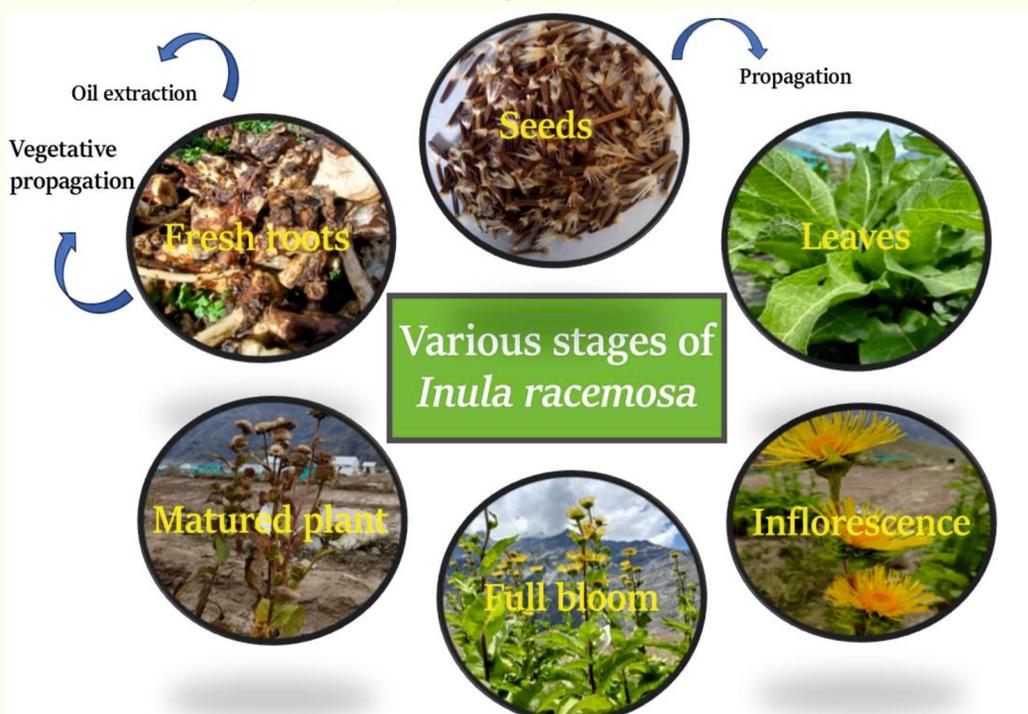
Morphological characters of 'Him Pushkarmool' in mid to high hills of Himachal Pradesh

Characters	Him Pushkarmool	Overall mean
Plant height (cm)	160.17	154.55
Number of branches	4.21	2.70
Number of basal leaves	7.25	5.10
Root biomass (g/plant)	553.39	392.28
Essential oil (mg/kg)	3393.21	1765.71

Growth Cycle

Pushkarmool is a perennial crop adapted to temperate and sub-alpine climates. Under high-hill conditions:

- Establishment phase: 3-4 months
- Active vegetative growth: Spring-Summer
- Root biomass accumulation: Late summer to autumn
- Economic harvest: Second year after planting



Agrotechnology

- Soil preference: Well-drained sandy loam to loam soils. Soil pH: Slightly alkaline (7.3-8.3).
- Organic manure: 15 tonnes FYM per hectare during land preparation.
- Spacing: 30×45 cm
- Climate: Cool temperate conditions with moderate rainfall
- Time of flowering: July-September (second year of growth)
- Crop duration: 2-2.5 years
- Root yield: 40 Qtl/ha in 2 years



Pushkarmool at Farmer's field in Miyar Valley



Fresh roots



Dried roots



Matured inflorescence

Propagation

Pushkarmool can be propagated via seeds or rhizomes/roots. Mature seeds are collected from flowers, with nursery raising advised for uniform stands; chilling is required to overcome seed dormancy. Rhizomes or roots enable vegetative propagation.

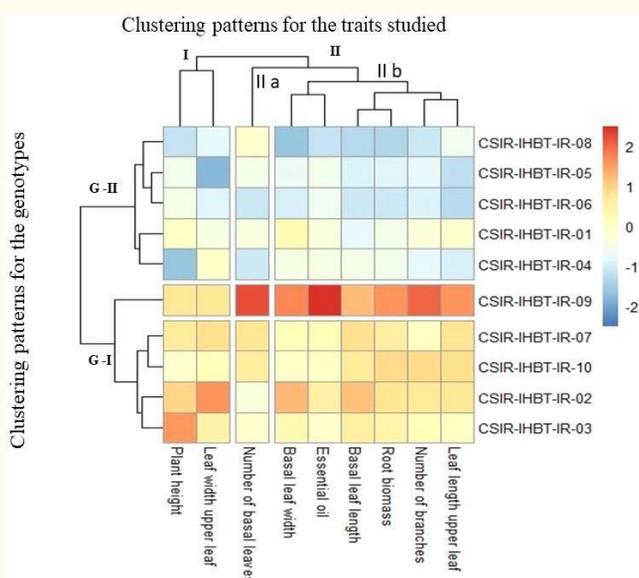
Harvesting and distillation

- Pushkarmool is ready for harvest within 2-2.5 years, after plantation. Roots having pharmaceutical value may be collected either in the month of March-April or in November-December at the time of senescence.
- Oil containing sesquiterpenes is extracted from the roots. Crop should be harvested at seed maturity stage for good oil content and quality. Dried roots produce better quality oil.

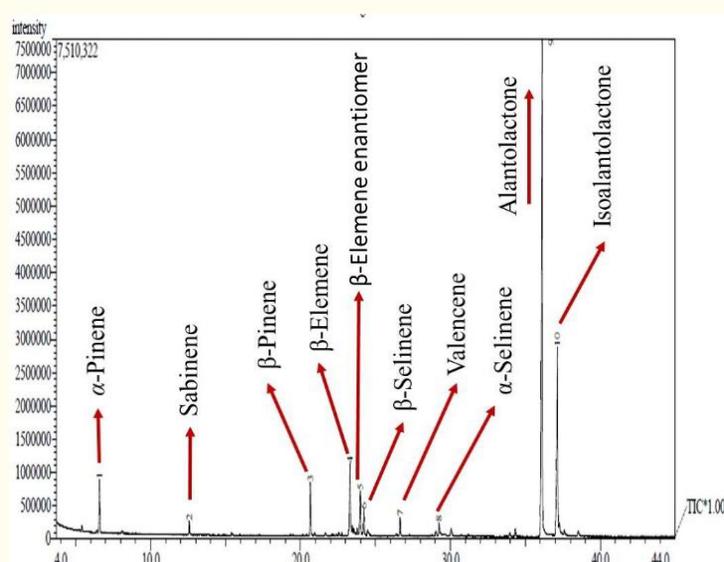
- Oil should not be exposed to sunlight, moisture and high temperature at any stage of distillation as these factors affect the quality of oil.

Storage

- After removing the roots from the soil, they are thoroughly cleaned and washed with running water, and then dried. The roots are then cut into small pieces and kept in a shaded place for drying, which takes approximately 15–20 days to dry completely. After proper drying, the roots are carefully packed in airtight containers and stored safely to maintain their quality before marketing.



Heat map and clustering patterns for the comparative performance of phenotypic traits and genotypes across all test environments



Representative chromatograph of essential oil compounds present in Pushkarmool

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