

# Dinanath grass: A potential fodder crop for dryland farming

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*Dinanath grass is a fast-growing, high-yielding forage species suited to dryland farming and low-input systems. Its adaptability to diverse soil types, tolerance to drought, and ability to regenerate after cutting make it a reliable source of green fodder in semi-arid regions. The crop is nutritionally rich, offering 10–12% crude protein, balanced fibre, and essential minerals, which support livestock growth, milk production, and overall health. Dinanath thrives well in warm climates with rainfall between 300–800 mm and grows well on sandy loam soils under full sunlight. It responds well to timely sowing and proper tillage, with a recommended seed rate of 3–4 kg/ha. Improved cultivars such as Bundel Dinanath-2 and Bundel Dinanath-3 offer high biomass yields and disease tolerance. Its compatibility with legumes and cereal intercrops enhances system productivity, profitability, and soil fertility. The inherent resistance of dinanath grass to major biotic and abiotic stresses enhances its adaptability to low-input dryland agro-ecosystems.*

**Keywords:** Climate resilience, Crop management, Drought tolerance, Improved varieties

**D**INANATH grass (*Pennisetum pedicellatum*) is a fodder species belonging to the Poaceae family. Indigenous to tropical and subtropical regions, it is widely accepted for its remarkable adaptability, fast vegetative growth, and high biomass production. As a fodder crop, dinanath has gained attention for its ability to thrive under low-input conditions and in diverse soil types, including marginal and drought-prone areas, making it a dependable resource in sustainable livestock systems. Its high palatability and digestibility make it a preferred green fodder for cattle, sheep, and goats. Moreover, its compatibility with mixed cropping systems, particularly with legumes, enhances soil fertility, soil retention capacity, and overall forage quality. Its incorporation into year-round feeding programmes not only mitigates seasonal forage scarcity but also supports improved productivity and resilience in smallholder farming systems.

## Nutritional quality

Dinanath grass is widely recognised as a nutritionally rich cereal forage, valued for its ability to support livestock performance. It offers a well-balanced composition of energy, protein, fibre, and essential micronutrients that make it suitable for both ruminant and non-ruminant feeding systems. Typically, it contains crude protein in the range of 10–12%, depending on the stage of harvest, contributing significantly to muscle development, milk secretion, and metabolic activity. The digestible energy content is comparatively high, fulfilling the caloric needs required for maintenance, growth, and lactation, especially in high-yielding dairy animals.

The fibre fraction, primarily composed of neutral and acid detergent fibre, is present in a balanced ratio (approximately 25–30%), ensuring efficient rumen fermentation and gut motility. Dinanath fodder also supplies

vital minerals such as calcium and phosphorus, alongside B-complex vitamins, all of which are fundamental for skeletal health, enzymatic functions, and immune resilience. Its soft texture and tender leaves enhance palatability, encouraging voluntary intake and improving nutrient utilisation. Notably, it is considered low in anti-nutritional factors such as oxalates and tannins, further enhancing its digestibility and suitability as a primary green fodder source. Therefore, dinanath is a dependable and sustainable option for improving livestock health and productivity under diverse agro-ecological conditions.

## Climate

It is exceptionally suited to warm, arid, and semi-arid climates, making it a reliable fodder crop in regions facing moisture stress. Its growth performance remains stable across temperatures of 25–40°C, underscoring its suitability

for warm tropical and subtropical environments. Its drought resilience allows it to perform well under annual rainfall of 300–800 mm, with the capacity to persist in even lower rainfall zones once fully established. Exposure to full sunlight is critical for vigorous growth, with shading resulting in substantial reductions in biomass accumulation. It serves as a reliable forage crop for dryland agriculture because of its thermal adaptability, minimal water requirement, and drought tolerance, especially in areas unsuitable for conventional fodder crops.

### Soil and tillage

Its successful cultivation depends significantly on appropriate soil selection and effective tillage practices. It thrives in well-drained loamy to sandy loam soils that are rich in organic matter. A slightly acidic to neutral pH range (6.0–7.5) supports optimal nutrient availability and root activity. Enriching the soil with compost or well-decomposed farmyard manure enhances fertility, improves soil structure, and promotes vigorous early growth. A well-prepared seedbed is crucial for ensuring

uniform seed placement and successful germination. Primary tillage (ploughing) is done to a depth of 15–20 cm to loosen compact layers, increase aeration, and facilitate root penetration. This is to be followed by secondary tillage using harrows or cultivators to break down clods, suppress weeds, and produce a fine tilth. These practices, when combined with suitable soil conditions, contribute to enhanced biomass yield, better root development, and long-term sustainability of dinanath grass-based fodder systems.

### Seed rate and sowing time

For optimal establishment of dinanath, a seed rate of 3–4 kg/ha is generally recommended using broadcasting or line sowing method. This ensures adequate plant population density for effective ground cover and biomass production. The ideal sowing period aligns with the onset of the monsoon season (June–July), when ambient soil moisture is sufficient to support rapid germination and early root development. In addition, seedling transplanting can be employed in areas requiring uniform stand

density. For transplanting, use six-week-old nursery-grown plants at 50 cm spacing. Approximately 33,000 seedlings are needed per hectare for optimal coverage. In areas equipped with assured irrigation, sowing can also be extended to the spring (March–April) or autumn (September–October) seasons. However, moisture availability remains a critical factor, as dinanath grass exhibits high sensitivity to early-season drought stress. Timely sowing, in relation to rainfall or irrigation schedules, plays a crucial role in successful crop establishment, uniformity, and subsequent forage yield.

### Improved varieties

Several high-yielding and regionally adapted cultivars of dinanath grass have been developed to enhance fodder security in arid and semi-arid regions of India.

### Intercropping system

Intercropping dinanath grass with suitable companion crops is a sustainable strategy to enhance land productivity, biodiversity, and soil fertility. Legumes such as cowpea, groundnut, and soybean

**Table 1.** Characteristics of dinanath grass cultivars

Cultivar	Year of release/ notification	Developed by	Recommended region	Characteristics
Jawahar Pennisetum-12	1974	JNKVV, Jabalpur	Madhya Pradesh, Chhattisgarh, Maharashtra and parts of Uttar Pradesh	Tall variety (156 cm) noted for its profuse tillering capacity (~34 tillers/plant) and broad leaves. With a leaf-to-stem ratio of 1.27, it is suitable for a two-cut system when the first cut is taken at the boot stage. Green fodder yield potential ranges from 480–520 q/ha.
Pusa Dinanath Grass	1983	ICAR-IARI, New Delhi	Arid and semi-arid regions of the country	Matures within 120–130 days and produces an average green fodder yield of 470–520 q/ha. Its adaptability across agro-ecological zones led to its release for nationwide cultivation except the hill zone.
Bundel Dinanath-1	1987	ICAR-IGFRI, Jhansi	Arid and semi-arid regions of the country	Late-maturing, drought-tolerant, high regeneration ability, tolerant to leaf spot and <i>Helminthosporium</i> diseases. Green fodder yield potential ranges from 300–350 q/ha.
Bundel Dinanath-2	1989	ICAR-IGFRI, Jhansi	Arid and semi-arid regions of the country	Similar to Bundel Dinanath-1 in key traits, it performs better under both biotic and abiotic stress conditions. Tolerance to leaf spot and <i>Helminthosporium</i> diseases, displays high fertiliser responsiveness, and is tolerant to lodging and drought conditions. Green fodder yield potential ranges from 300–480 q/ha.
COD-1 (TNDN-1)	1997	TNAU, Coimbatore	Rainfed conditions of Tamil Nadu	Tolerant to drought conditions and has an excellent fodder quality. Green fodder yield potential ranges from 500–550 q/ha.
Bundel Dinanath-3 (JHD-19-4)	2023	ICAR-IGFRI, Jhansi	Arid and semi-arid regions of West Bengal, Jharkhand, Odisha, Assam, Bihar, Madhya Pradesh, and Uttar Pradesh	High crude protein (8.5%) and <i>in-vitro</i> dry matter digestibility (48.3%). Moderately resistant to leaf spot disease. Green fodder yield potential ranges from 400–450 q/ha.



Field view of dinanath grass



Panicle of dinanath grass

are particularly effective intercrops, as they fix atmospheric nitrogen and improve forage protein content. Grain type maize and pearl millet may also be integrated in spatial arrangements, offering both fodder and grain while optimising land use. Such cropping systems contribute to efficient nutrient cycling, better pest and weed management, and diversified farm income.

#### Nutrient management

Nutrient management is crucial for achieving high forage quality and yield. A general recommendation for medium-fertility soils includes 60–80 kg/ha of nitrogen, 30–40 kg/ha of phosphorus ( $P_2O_5$ ), and 30 kg/ha of potassium ( $K_2O$ ). Half the nitrogen and the full doses of phosphorus and potassium is applied at sowing. The remaining nitrogen is to be top-dressed 45 days after emergence. In nutrient-deficient soils, a 25% increase in fertiliser rates is advised to compensate for limited soil fertility.

#### Water management

Although dinanath grass is inherently drought-tolerant, maintaining optimal soil moisture enhances both plant establishment and yield. It thrives in well-drained soils where moderate moisture is sustained without waterlogging. Supplemental irrigation during dry spells ensures consistent growth but must be carefully regulated, as overwatering can reduce drought resilience.

#### Harvesting and biomass yield

The crop is harvested at 50 percent flowering stage (60–70 days after sowing) for optimum nutritive value, better palatability, higher dry matter yield and acceptable fibre content. Well-managed stands can yield 400–500 q/ha of green and 75–95 q/ha dry biomass, with slightly lower yields in drought-prone environments. Nevertheless, the species' capacity to produce forage under harsh conditions makes it a

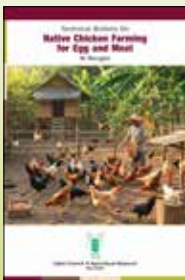
reliable fodder source for marginal lands.

#### SUMMARY

Dinanath grass is a versatile and sustainable fodder species, mostly cultivated in *kharif*, ideally suited for arid and semi-arid agro-ecosystems. Its resilience to climatic extremes, high per day productivity, and better nutritional quality contribute to efficient livestock fodder systems. Its suitability in intercropping, high input use efficiency, and climatic advantage in grasslands enhances its productivity, supporting both ecological sustainability and economic viability. Development, deployment and adoption of improved varieties and agronomic practices can substantially increase fodder production and availability in anthropogenically accelerated climate change.

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#### TECHNICAL ASPECTS

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