



The Chia Revolution: Implications for Sustainable Agricultural Transformation in Madhya Pradesh

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Abstract

Chia (*Salvia hispanica* L.) is an emerging superfood crop valued for its rich nutritional and medicinal properties. The seeds are excellent sources of omega-3 fatty acids, dietary fibre, protein, antioxidants, vitamins and minerals. In Madhya Pradesh, particularly the Malwa region, Chia cultivation is gaining popularity due to favorable climatic conditions, low water requirement and high economic returns. Compared to traditional *rabi* crops, Chia requires lower input costs and fewer irrigations. Increasing demand for healthy and functional foods, along with government support and value-addition opportunities, makes Chia a profitable and sustainable crop with strong future potential in Madhya Pradesh.

Keywords: Chia cultivation, Crop diversification, Madhya Pradesh, Sustainable agriculture

Introduction

Chia (*Salvia hispanica* L.) is a medicinal and dietary plant species belonging to the Lamiaceae family and is native to Mexico and Guatemala (Ixtaina *et al.*, 2008). It is an emerging crop widely recognized as a functional food. Chia seeds are rich sources of omega-3 fatty acids, antioxidants and calcium and are known for their potential role in preventing heart disease, diabetes and cancer. The seeds are consumed in various forms, either whole or ground and are commonly added to fruit juices, milk, refreshing drinks and salads. Chia flour is also used in bakery and beverage industries because of its gel-forming and fat-binding properties, along with its nutritional and functional benefits.

Chia is currently cultivated in Australia, Bolivia, Colombia, Guatemala, Mexico, Peru, Paraguay and Argentina (Busilacchi *et al.*, 2013). Mexico remains the largest production center and exports Chia seeds to Japan, the USA and Europe (Migliavacca *et al.*, 2014). In India, Chia cultivation has recently been introduced in small pockets of Madhya Pradesh, Andhra Pradesh, Gujarat, Maharashtra, Karnataka, Rajasthan, Haryana and Himachal Pradesh.

Chia is becoming increasingly popular worldwide as a

superfood, leading to a rapid increase in its cultivation and consumption to meet the growing demand in both international and Indian markets. Therefore, it has great potential as a profitable commercial crop in India.

In Madhya Pradesh, traditionally known as the "Soya Bowl of India," agriculture is gradually shifting toward high-value crop diversification. Among the emerging crops, Chia has gained considerable attention. Originally an exotic superfood from Central America, Chia has adapted well to the black cotton soils and semi-arid climate of districts such as Neemuch, Mandsaur and Ratlam. As climate change increases the uncertainty associated with traditional *rabi* crops like wheat and gram, Chia has emerged as a resilient and profitable alternative crop for the Malwa region.

Why Madhya Pradesh?

Chia is a hardy, low-maintenance, short-day crop that is well suited to the climatic conditions of Central India. It requires significantly less water than traditional cereal crops and grows well in shallow black and sandy-loam soils. Due to the presence of natural essential oils, the crop shows resistance to most pests and important for Indian farmers, is rarely grazed by stray cattle.

Article History

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Botanical Description

Chia (*Salvia hispanica* L.) belongs to the family Lamiaceae and is commonly referred to as Chia, Spanish sage, Mexican Chia or black Chia. It is an annual herbaceous plant that grows nearly one meter tall and bears opposite, petiolate leaves with serrated margins, measuring about 4-8 cm in length and 3-5 cm in width. The plant produces hermaphrodite flowers during the summer season. Chia is a short-day crop that requires more than 12 hours of light to induce flowering. It adapts well to a variety of well-drained clay and sandy soils and shows moderate tolerance to saline and acidic conditions. Under normal cultivation practices, the crop yields around 500-600 kg of seed acre⁻¹, whereas yields up to 2,500 kg acre⁻¹ have been recorded under improved agronomic management (Cahill, 2003).

Chia plants have angular stems and branches with oppositely arranged serrated leaves that range in colour from lime green to dark green. Stem colour may vary from green to purple due to pigmentation. Small flowers (3-4 mm) are borne in clusters on inflorescences, with each cluster containing 50-100 white or blue flowers (Figure 1). The flowers are hermaphrodite and consist of fused sepals, coloured petals, two stamens, one bifid stigma and four ovaries. Chia is predominantly self-pollinated, although some cross-pollination occurs through insects, particularly bees. After pollination, all four seeds usually develop successfully. The seeds vary in colour from grey or black-spotted to white with grey streaks. They are oval to oblong in shape and measure about 1-2 mm in size.



Figure 1: Chia plants

Important Points

1. Madhya Pradesh is emerging as a hub for Chia cultivation, particularly in the Malwa region.
2. The crop offers high returns (₹ 75,000.00 - 1,00,000.00 acre⁻¹) with low input costs and minimal water requirements

(Table 1).

3. Government schemes such as the Pradhan Mantri Formalisation of Micro Food Processing Enterprises (PMFME) and state horticulture/ agricultural subsidies are encouraging its adoption.

4. Successful cultivation depends on precise sowing depth (0.5-1.0 cm) and proper timing of the harvest window to avoid seed shattering.

Scope of Chia Cultivation

Due to its high nutritional and medicinal importance, Chia has significant potential for use in the food, nutraceutical and pharmaceutical sectors. Chia seeds and their by-products are widely utilized in various industries as stabilizers, binders and emulsifiers in food products and are also used in the production of biodegradable films, cosmetics and pharmaceutical products.

Chia: A Nutritional Powerhouse with High Market Potential

1. Chia seeds are rich sources of omega-3 and omega-6 fatty acids, high-quality protein, dietary fibre, vitamins, minerals and various polyphenolic antioxidants that help protect the seeds from chemical and microbial deterioration.
2. The presence of higher amounts of tocopherols, carotenoids, phytosterols and several phenolic compounds makes Chia a promising natural source of antioxidants.
3. Chia seeds contain about 20.3-38.6% edible oil, with a high proportion of α -linolenic acid (55-60%), along with around 35% fibre and 20% protein, providing a balanced composition of essential amino acids.
4. The increasing demand for Chia seeds is mainly due to their exceptional nutritional value and growing recognition as a superfood.
5. These small seeds are excellent sources of omega-3 fatty acids and contain approximately 30-34% dietary fibre.
6. When soaked in water, Chia seeds can absorb up to twelve times their weight, forming a gel-like substance that supports digestion and helps regulate blood sugar levels, making them highly beneficial for health-conscious consumers.
7. By cultivating Chia, farmers are contributing to the expanding global wellness market, as the crop is rich in calcium, plant-based protein, antioxidants and other health-promoting nutrients.

Uses of Chia as a Superfood

1. Chia seeds provide energy and improve stamina due to their balanced nutritional composition.
2. They support heart health by helping regulate cholesterol and blood pressure.
3. Antioxidants in Chia help protect skin cells and delay premature aging.
4. High fibre content helps in better blood sugar regulation and diabetes management.
5. Chia improves digestion, promotes bowel regularity and supports gut health.
6. The seeds create a feeling of fullness, which helps in weight management.

7. Omega-3 fatty acids in Chia help reduce inflammation and joint discomfort.
8. Chia is rich in antioxidants that protect body cells from damage.
9. Essential fatty acids support brain function, memory and concentration.
10. Soluble fibre helps maintain stable blood glucose levels.
11. Chia seeds are a good source of protein and essential minerals.
12. Calcium, magnesium and phosphorus in Chia help strengthen bones and teeth.
13. Nutrients and antioxidants in Chia help improve immunity.
14. Preliminary studies indicate that Chia may have protective effects against certain cancers.

Government Support and Schemes Promoting Chia Cultivation

The expansion of Chia cultivation is being encouraged through various government initiatives aimed at promoting medicinal and aromatic crops in India. These schemes provide financial assistance, subsidies and infrastructure support to farmers and entrepreneurs.

1. *Aushadhi Avam Sugandhit Fasal Shetra Vistar Yojana* (AASFSVY): Under the Madhya Pradesh State Horticulture Department, farmers can avail subsidies ranging from 20% to 50% for expanding the cultivation area of medicinal and aromatic crops. Financial assistance is provided for land holdings between 0.25 and 2.00 hectares.
2. *PMFME Scheme*: Under the “One District One Product” (ODOP) initiative, the government offers a 35% credit-linked subsidy of up to ₹ 10 lakh for establishing micro-processing units. This support enables farmers to undertake local cleaning, grading and packaging of Chia seeds.
3. *National Medicinal Plants Board* (NMPB): The NMPB provides financial assistance for the conservation, cultivation and large-scale production of high-value medicinal crops such as Chia through its regional centers and promotional programs.

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4. In Madhya Pradesh, Rashtriya Krishi Vikas Yojana in the agriculture department has started Chia seed cultivation under crop diversification in Agar Malwa and Mandla district since Rabi 2025 and results are outstanding.

Economy of the “Super-Seed”

For a farmer in Madhya Pradesh, Chia is a masterstroke in risk management. Table 1 shows the comparison between the traditional *rabi* crop and Chia seed cultivation.

Cultivation Strategy and Critical Precautions

To achieve higher returns from Chia cultivation, precise crop management is essential.

1. *Sowing Time*: The ideal sowing period is from 1st August to 15th September.
2. *Sowing Depth*: Seeds should be sown at a depth of 0.5-1.0 cm. Deeper sowing may prevent the tiny seedlings from emerging properly.
3. *Germination Phase*: Although Chia becomes drought tolerant at later stages, the field should remain consistently moist during the first 7-10 days after sowing. Waterlogging must be avoided, as the roots are highly susceptible to rotting.
4. *Weed Management*: Chia is a slow-growing crop during the initial stages. Manual hoeing or weeding is necessary during the first 30-45 days until the crop canopy is fully established.
5. *Harvesting Time*: Harvesting should begin as soon as the spikes turn brownish-golden and the lower leaves start drying and falling. Delayed harvesting may lead to seed shattering and significant seed loss.

Quality Assurance for the Premium Market

Farmers should emphasize organic cultivation practices, as the high-value Chia market mainly caters to health-conscious consumers seeking residue-free products. The application of farmyard manure (FYM) and neem-based formulations in place of chemical inputs can enhance seed quality and fetch better market prices. To minimize losses from bird damage, the use of reflective tapes and other bird-repelling measures is recommended during the last 15 days before harvesting.

Marketing of Chia Seeds

Chia seeds are usually marketed through retailers and wholesalers based on demand and pre-arranged purchase agreements. As Chia is an emerging crop in India, an organized procurement system has not yet been established. Among the available markets, Neemuch district of Madhya Pradesh has become an important center for Chia seed trade (Harisha *et al.*, 2025).

Future Scope of Chia Cultivation in Madhya Pradesh

1. Madhya Pradesh, particularly the Malwa region is emerging as a suitable area for Chia cultivation due to its favorable climate and soil conditions.
2. Growing demand for healthy and functional foods has created new market opportunities for Chia seeds in domestic and international markets.
3. Chia can become an important alternative crop for farmers because of its low water requirement and comparatively lower cultivation cost.

Table 1: Comparison between the cultivation of traditional *rabi* crop and Chia seed

Parameters	Traditional <i>Rabi</i> (Wheat/Gram)	Chia Seed Cultivation
Input Cost (acre ⁻¹)	₹ 15,000.00 - 20,000.00	₹ 6,000.00 - 7,000.00
Water Requirement	High (4-6 irrigations)	Low (2-3 irrigations)
Average Yield (acre ⁻¹)	15-20 Quintals	4-6 Quintals
Market Price (quintal ⁻¹)	₹ 2,200.00 - 5,000.00	₹ 14,000.00 - 18,000.00
Net Profit (acre ⁻¹)	₹ 25,000.00 - 35,000.00	₹ 75,000.00 - 1,00,000.00

4. Expansion of Chia cultivation in districts such as Neemuch, Mandsaur, Ratlam, Agar-Malwa and nearby areas can increase farmer income and crop diversification.
5. Development of high-yielding and photo-insensitive varieties suitable for Madhya Pradesh conditions can improve productivity and adaptability.
6. Promotion of organic cultivation practices can help farmers access premium markets and higher prices.
7. Establishment of local processing and value-addition units for products such as bakery items, beverages and nutraceuticals can create employment and improve profitability.
8. Government support through horticulture schemes, PMFME and medicinal crop promotion programs can encourage wider adoption of Chia cultivation.
9. Regular monitoring of pests, diseases and seed quality will help maintain sustainable production and market standards.
10. With increasing awareness, research support and market demand, Chia has strong potential to become a profitable high-value crop in Madhya Pradesh.

Conclusion

Chia cultivation is emerging as a profitable and sustainable crop option in Madhya Pradesh, particularly in the Malwa region. The crop requires less water, lower input costs and is well suited to the agro-climatic conditions of the state. Due to its high nutritional and medicinal value, Chia has gained strong demand in domestic and international markets. Government support, organic cultivation practices

and value-addition opportunities are further encouraging its adoption among farmers. Compared to traditional *rabi* crops Chia offers better economic returns and climate resilience. Thus, Chia cultivation can play an important role in improving farmer income, nutritional security and sustainable agriculture in Madhya Pradesh.

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