

# A Decade Timeline of Crop and Variety Shifts in Madhya Pradesh and Bundelkhand



Grassroots Perspectives on  
Biodiversity Loss and Shifting  
Landscape of Crops and Varieties  
in Madhya Pradesh



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# EXECUTIVE SUMMARY

This study investigates the change in crop species & crop varieties and agricultural practices in Madhya Pradesh and Bundelkhand. The research draws on insights from Focus Group Discussions (FGDs) with local farmers, who shared data on what they cultivated the crops changed over last seven eight decades. They also shared perspectives on biodiversity loss, soil health decline, economic pressures, and environmental challenges linked to modern agricultural practices. Also sharing their experience on how modern agriculture increased produce and prosperity.

The findings reveal significant biodiversity losses, with indigenous crop varieties nearly disappearing and traditional mixed cropping practices replaced by monocropping. This shift has increased dependency on chemical inputs and reduced natural resilience, especially impacting small and marginal farmers who face high input costs and water scarcity. These farmers, increasingly reliant on market-purchased crops for household food security, are more vulnerable to market fluctuations and climate change impacts.



The study presents key policy recommendations, emphasizing the importance of reintroducing indigenous crop varieties, promoting multi-cropping and organic farming practices, and strengthening local governance institutions. Specific recommendations include establishing community seed banks of indigenous seeds that are climate and pest attack resilient, reintroducing millets in Government programs like PDS, ICDS, MDM etc, research on natural farming practices to expand its scope and reach economy of scale, investment in agriculture research to blend indigenous varieties with modern agriculture, innovation on agriculture implements to support mixed cropping etc.

By implementing these measures, policymakers can help build resilient agricultural systems that support biodiversity, improve soil health, and enhance the economic well-being of smallholders in the region.



# 01 | Fading Flavors and Forgotten Varieties The Evolution of Crops for Yield, Ease and Taste

The shift to a relatively settled way of life was made possible by the development and adoption of early agricultural practices. This had impacts on plants, biodiversity and on the agriculture. Traits and characteristics of plants favoured by mankind, both consciously and unconsciously led to selection and elimination of species, crops and varieties. Very often traits suited to species growing, such as production, taste, storage, cultivation etc. came to be preferred for agriculture. This has been the beginning of change in agriculture where unfavourable varieties were discarded. As agriculture developed, the environment of the field and paddock became increasingly differentiated from that of the natural environments in which plants and animals originally evolved. Thus, nutrient availability generally rose, plant density and genetic uniformity increased, and the balance in competition shifted to inter-species considerations. Consequently some of the not so preferred species and varieties are nearly lost with species not grown and seeds not easily available.

The Indian region is one of the world's 8 centres of origin of crop plants. About 166 crop species and 320 wild relatives of crops have originated here. Genetic diversity within each species is also tremendous. However, the change in agro-economic

environment led to heightened selection and elimination in species and varieties of crops.

In the year 1950-51 for which the data of agricultural production of majority of the commodities are available by the authorized sources, we have been producing about 135 Mt from agriculture and allied sectors. In 2021-22, total production of food and non-food items was about 1300 Mt. This multi-fold increase in the production of all the commodities, in spite the net sown area remaining almost constant, ensured food security and rural livelihood. This process of selection and elimination of preferred species and varieties came at economic costs, environmental costs, biodiversity costs and equity costs where small and marginal farmers are rapidly losing the race. Hybrid seeds were introduced in





the 1950s and 1960s with the onset of green revolution. Domination of rice and wheat in agrarian markets pushed even small farmers to grow them, despite them not being capable of input intensive agriculture.

Consequently some of the common crops/ varieties prior to green revolution have disappeared from the fields, so much so that young farmers do not know of them, do not grow them and seeds for the same are not available. Species and varieties grown today is an outcome of diverse selective forces and modern agriculture.

Farmers are also wise and resilient and after years of using hybrid seeds, and selective crops, farmers are questioning if bio-diversity loss was causing long-term damage, uncontrolled growth of pests, or fewer species of healthy bacteria, manifold increase in consumption of chemical fertilizers and pesticide and unsustainable utilization of natural resources. Some of the farmers are realising the increasing need to shift away from Green Revolution practices and encourage using Indigenous knowledge to ensure resilient food systems.

Agriculture in Madhya Pradesh (MP) is a cornerstone of the state's economy,

contributing around 40% of its GDP and employing nearly 70% of the population (Government of Madhya Pradesh, 2022). Known as India's "Soybean Bowl," MP produces roughly 50% of the nation's soybeans. Food grain production in the state has surged from 9.2 million tons in 2000 to nearly 30 million tons by 2020 (Agricultural Statistics at a Glance, 2021). However, the focus on high-yield monocropping has resulted in environmental and social costs, especially in rain-fed areas like Bundelkhand.

Past studies highlight the socioeconomic impacts of monocropping on small and marginal farmers, who often face high costs for seeds and chemicals, thus heightening their susceptibility to market price fluctuations (Tripathi et al., 2019; Kaur & Sharma, 2020). In contrast, integrating indigenous crop varieties and mixed cropping systems can promote ecosystem resilience and economic stability (Sharma et al., 2021). This community led investigation contributes to the literature by examining crop species and variety change in MP and Bundelkhand, providing evidence to support policy recommendations that encourage sustainable farming practices.



## 02 | Methodology

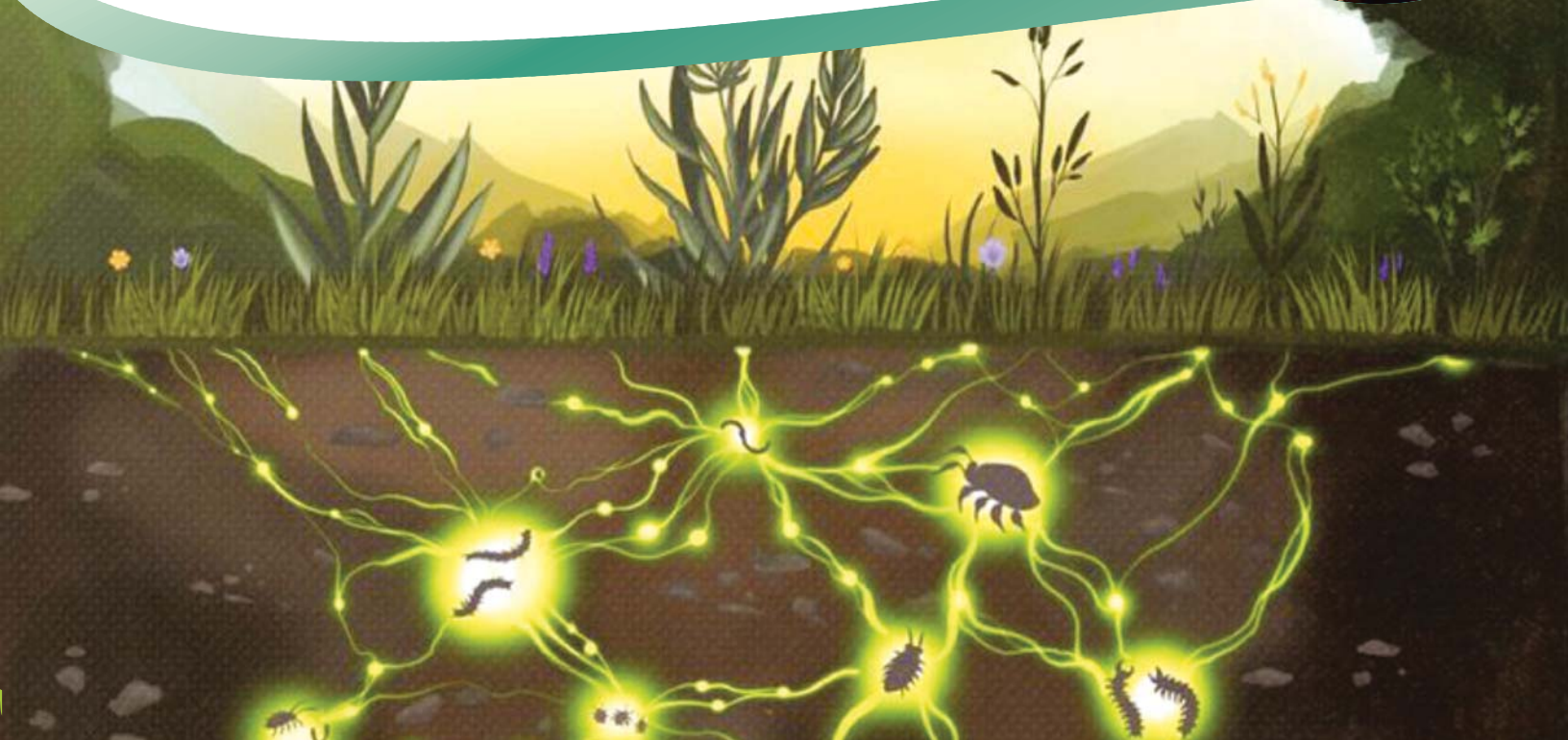
Focus Group Discussions (FGDs) and individual interviews with farmers of different age groups in 10 districts of Madhya Pradesh. This methodology was chosen to gain in-depth, contextual insights from farmers across various age groups and farm sizes, enabling a comprehensive understanding of agricultural changes over time. FGDs are particularly suited for exploring collective memory and experiences, as participants can recall past practices and compare them with current systems. This approach is critical for capturing the local knowledge and perspectives of farmers who have witnessed and adapted to decades of agricultural transformation.

The sample included 100 FGDs with farmers across the regions of Bundelkhand and Madhya Pradesh, covering key agricultural districts. Locations included Panna, Chattarpur, Tikamgarh, Jhansi, and Mahoba in Bundelkhand, along with Sehore, Dhar, Badwani, Mandla, and Umaria from other parts Madhya Pradesh. The discussions were segmented by age and farm size, with separate groups for younger farmers (up to 40 years), middle-aged farmers (40–60

years), and older farmers (60+ years) who could provide historical perspectives on past agricultural practices. In cases where farmers over 70 were unavailable, individual interviews were conducted.

The recall method was employed to help farmers recount the types of crops grown and methods used in previous decades, facilitating a temporal comparison of agricultural practices and crop varieties. The study also accounted for economic diversity, with FGDs segmented by small, marginal, and large farmers to explore how economic factors influenced farming practices and access to resources. This structured approach allowed for detailed data collection on the evolution of crop diversity, the adoption of monocropping, the shift to market-based seed sources, and changes in pest management and soil health.

**Objective-** To analyze the shifts in agricultural species, varieties, and practices in Madhya Pradesh and Bundelkhand over the past seven decades.



**The major findings emerging from the data collected from the sampled farmers are organised in the following manner :**

### **Key trends-**

- Evidently Kharif was popular season as agriculture was largely rain fed. Rabi crops was grown only by selected few for a selected species that could grow in less water. Therefore indigenous rice variants, cotton, maize and millets of the Kharif were popular crops.
- Mixed cropping was popular across districts and regions till 80s, which has nearly disappeared after the turn of the century. Currently even millets like Kodo/ Kutki are also sown as standalone crop.
- Cultivation of Tilhan, and Dalhan have reduced substantially as mono-cropping took over from mixed cropping pattern. This has impacted soil health
- Hybrid variety of seeds replaced the indigenous seeds, nearly completely in 70s and eighties. It is common, particularly in western and central MP that farmers actively search for seed varieties that give higher production.
- Earlier Seeds were stored within the household or sometimes friends and relatives provided them, as against current practice of procurement from the market.
- Seed treatment was undertaken even 50 to seventy years back. Cow urine (Gow-Mutra), Chaas (butter milk), Sandi were commonly used for to treat seeds. It has been replaced by market based chemicals.
- Some seeds like of the prominent crops of the past have totally disappeared. For example, Sanai, Jhalaar rice, Kangni Rice, San (rope making material) etc.
- Millets were common across regions and districts, and has made way for rice and wheat. Access to irrigation and farm development interventions have increased Rabi areas. Popularity of Wheat has increased since then.
- Earlier, there was far less pest infestation, and pests were manageable and easily treatable. Since infestation have increased considerably, chemicals are used rampantly. Pesticides use has increased manifold in last three-four decades.
- Some species like Sanai (used for making ropes) and varieties like kala Dhan (indigenous rice variety), kardhani, Kanki dhan have disappeared.

- Some farmers in eastern MP reported broadcast method of seeding while most farmers in western, central MP have shifted to Ropa method, that is sowig the plant.
- Jait crops have increased considerably, mostly of vegetables.
- There have been improvements in the farms. There was a push for mud-bunding with green revolution, thus many farmers undertook bunding. This led to increased Soil moisture and changed preferences for crop verities. Many farmers have some or other soil moisture intervention in farms, ranging from Mud-bundling, well construction, access to any other water body, bore well etc. Currently agricultural practices have become differentiated in favour of a species or variety of a crop.
- Mechanisation has replaced manual labour and use of 'HAL-BAIL'. This replacement led to gradual reduction of livestock with the farmers. Most farmers do not keep cattle and find it unviable. Goat and poultry have replaced Cow and Bufallow
- As manual labour became challenging, it became challenging to de-weed, leading to increased use of weedicides.
- Mixed cropping ensured availability of several crops though in small quantities. This suited personal consumption of the household, however, now households

grow one or two crops, but in larger quantity. Farmers of all type of farm sizes market the crops to buy other food and household items.

- Marketing of seeds have increased manifolds and seeds have become expensive.
- Though the production has increased considerably, but the production is extremely sensitive to availability of sufficient water. The hybrid seeds and newer verities are fail in sub optimum water.
- Most farmers, particularly the relatively younger ones are appreciative of increased production and marketing of produce. However, some relatively aged farmers do value the health, net income and overall happiness that harvests brought in their households.



### 3.1 Growing trend of reduced crop diversity

The table given below illustrates a shift from diverse, indigenous crops to a smaller group of high-yield varieties. Traditional crops, including minor millets and pulses, have nearly disappeared, replaced by more input-intensive options like hybrid varieties and crops like soybean.

**Table 3.1. Shifts in Crop Varieties and Loss of Biodiversity**

<b>Kharif</b>			
	Western/central MP (Dhar Barwani, Sehore)	Bundelkhand	Mandla, Dindori, Umaria (Eastern M.P)
Currently popular	Cotton, Soybean, Maize, Aarhar, Urad, Sesame, Samak, Moong, Coriander, Barley	Paddy, Urad, Moong, Arhar, Jawar, Groundnut, sesame, Mentha	Paddy, Maize, Urad, Moong,
Popular 40-50 years ago	Maize, Aajwain, Jawar, Bajra, Urad, Kodo. Kutki, Samak, Seasmе, Ram Til, Jagni, Amari, Sanai, Kangi	Kutki, Samak, Seasmе, Alsi Ramtil, Moong, Amari, Arandi (Castor), Sanai, Rehua, Urad, Ragi, Jawar, Aarhar, Maize, kodo, Peas	Samak, Seasmе, Ramtil, Kardhani and black Paddy varieties, Junar, Aarhar, Kangi rice, Jagni Amari
<b>Popular Rabi crops</b>			
<b>Currently popular crops</b>	Wheat, Gram, Masoor, Batra, Rai, Mustard, Peas, Alsi,		
<b>Forty fifty years back</b>	Kathia Genhu, Gram, Alsi, Batri, black Matri, Lahi, Senhua, Sarai		

#### Crops Disappearing or Declining in Cultivation Across Specific Districts

- **Rope making fibre species-** Sanai, San, Rehua Medha have completely disappeared.
- **Many oilseed crops have nearly disappeared** - such as Lahi, Alsi, Ramtil as markets diminished
- **Dalhan crops reduced heavily**– Moong, Urad, Arhar, Batla, Batri, Teuda was grown with other main kharif crop. Gradually growing Dalhan stopped as mixed cropping stopped
- Some indigenous varieties have disappeared completely such as Black, kanki, kagni varieties of paddy, Arhar, and other lentils such as Kala dhan, Kali Arhar, PC wheat, Teuda, Batla, bade ring ka jowar etc.
- Varieties grown for animal feed have disappeared like Tiuda have disappeared
- Millets, particularly minor millets such as Kodo, Kutki disappeared, making a comeback in eastern region

#### Adoption of New Crops and Varieties in Traditional Regions

- Region specific new crops have emerged for example urad and moong was never grown in summers in Mandla, dindori area.
- Surprisingly, Mentha cultivation is being done in Panna district.
- Cultivation of Peas and groundnuts have increased in Bundelkhand over last few decades.
- Soybean increased considerably in central and western Madhya Pradesh
- Cultivation of Paddy and different hybrid variants increased substantially in Bundelkhand and other eastern districts



### 3.4 Various mixed cropping combinations are losing preferences

The data shared below in table 3.2 clearly reflects that mixed cropping, which contributed to nutrient balance and natural pest control, has been replaced by monocropping. This shift increases dependency on chemical fertilizers and pesticides and diminishes ecosystem resilience. Loss of traditional crop combinations has led to heightened soil degradation and vulnerability to pest outbreaks.

### 3.3 Adoption of New Crops and Varieties in Traditional Regions

Traditional Crop Combinations (40–50 years ago)	Current Status
Cotton with Arhar, Maize, Cucumber, Marigold	Rarely practiced
Soybean with Arhar, Urad, Maize	Mostly replaced by monocropping
Maize with Arhar, Jawar, Moong, Urad, Bhindi	Reduced to few instances of mixed crops
Kodo with Arhar, Sesame, Ram Til	Almost non-existent

### 3.4 Alarming trends in degradation of soil health

The table below shows the rise in chemical inputs and associated pest resistance. Modern hybrid crops require chemical fertilizers and pesticides, which degrade soil health and create a dependency on costly inputs. This trend has reduced soil fertility and disrupted local ecosystems, impacting long-term productivity and smallholder sustainability.

**Table 3.3. Decline in Soil Health and Pest Resistance**

Time Period	Pesticide Usage	Fertilizer Usage	Pest Resistance Observed
Pre-Green Revolution	Minimal and indigenous like Neem, whey, cow urine etc	Cowdung	Manageable
1970s-80s	Moderate increase in chemical pesticides. Moderate usage frequency	Moderate use chemical fertilizers, cow dung	Beginning of resistance
1990s-Present	High dependence on potent, extremely harmful pesticide. Used periodically, pests frequently develop resistance	Chemical fertilizers with increasing quantities over years	High resistance observed

### 3.4 Consequences of changing cropping patterns on small and marginal farmers

This community narratives highlighted the financial strain on smallholders, who rely heavily on market-purchased inputs and face low affordability for high-input seeds. The switch to monocropping has reduced the availability of household food crops, making farmers more dependent on markets and vulnerable to price volatility.



**Table 3.4. Economic and Social Impacts on Small Farmers**

Farm Size	Dependency on Purchased Inputs (%)	Ability to Afford High-Input Seeds	Market Reliance for Household Needs
Small	75%	Low	High
Marginal	80%	Very Low	Very High
Large	60%	Moderate	Moderate

## 04 | Key Findings

The following are the key findings emerging from the community level insights:

01

**Biodiversity Loss:** A significant reduction in crop diversity has occurred, with many indigenous varieties nearly extinct. This decline in genetic diversity impacts climate resilience and limits local adaptation to changing conditions.

**Decline in Mixed Cropping:** Traditional mixed cropping practices have been largely replaced by monocropping, which depletes soil nutrients, increases chemical dependency, and reduces natural pest control.

02

03

**Increased Chemical Dependency:** Farmers increasingly depend on chemical fertilizers and pesticides, which degrade soil quality and increase production costs, disproportionately affecting smallholders who struggle with rising input costs.

**Economic Challenges for Smallholders:** The shift to high-input farming has placed financial strain on small and marginal farmers, who rely more on purchased inputs and face lower affordability for hybrid seeds. Many are now dependent on market-purchased food, which increases their vulnerability to market price fluctuations.

04

05

**Water Scarcity Concerns:** The dominance of water-intensive crops, especially in rain-fed areas, has heightened water scarcity issues, further complicating the viability of high-input agriculture for smallholders in regions like Bundelkhand.

## 05 | Policy Recommendations

The following are the key recommendations to promote crop diversity for sustainable livelihoods:

### Reinstate Indigenous Seed Varieties and Strengthen Seed Sovereignty

- **Establish Community Seed Banks :** Department / Agriculture research institutes should support seed banks to preserve indigenous seeds that are climate resilient and pest resilient.
- **Incentivize indigenous crops and diversity :** Financial incentives for growing diverse, indigenous varieties such as subsidised allocation in market place to vendors selling indigenous varieties, positive procurement of indigenous varieties in government procurement system.

### Extension programs to tune in to sustainable agriculture

- **Local governance institutions, including Gram Panchayats (GP), and Self- Help Groups (SHGs),** should be empowered to lead sustainable agricultural practices. Extension education of local, indigenous varieties, natural farming practices can be incentivised through women SHGs and local units of State livelihood Mission.
- **Facilitate Farmer-to-Farmer Learning: through FPOs, Producer groups-** These institutions can also support peer-led training and demonstrations to encourage traditional practices, knowledge exchange, and community-driven adoption of climate-resilient, low-input agricultural techniques.

### Promote Multi-Cropping and Organic Practices

- Research on combination crops, how the practice can be encouraged and sustained in context of labour requirements and ease of harvesting
- Innovation on agriculture implements that support mixed crop harvesting
- Encourage Bio inputs : Setting up large hubs and Marts to sell natural Bio- fertiliser/bio pesticides, so that bio- alternatives are easily available to the farmers. Such centers should be provided subsidised credit and provided the same on priority basis.
  - Forward market linkage support to crops grown organically like certification. Improved pricing etc.
  - Farmers should be trained in organic soil amendments, reducing reliance on costly chemical fertilizers.

## Conclusion

*By blending traditional knowledge with sustainable practices, policy-makers can help build resilient agricultural systems that protect biodiversity, enhance soil health, and improve smallholders' livelihoods. Local institutions have a pivotal role in facilitating these sustainable shifts, ensuring that agricultural practices align with the community's environmental and economic well-being. Embracing this approach will not only bolster local food.*



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