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*Original Article*

# Exploring Seed Bank in Mahuva Taluka of Bhavnagar District: A Comprehensive Survey

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## ABSTRACT

In order to protect plant biodiversity, improve ecological resilience, and ensure agricultural sustainability, seed banks are essential. This study explores how to conserve and store seeds from various habitats of Bhavnagar district (Gujarat, India). Seeds are collected, categorized, and stored. The study investigates the ecological significance of these seeds, the conservation strategies used, and the possible advantages for ecological restoration, sustainable agriculture, and biodiversity preservation. The study emphasizes the critical role of seed banks in reducing the effects of climate change, fostering food security, and aiding in habitat restoration by analyzing more than 100 seed samples from grasslands, woods, wetlands, desert regions, and agricultural fields. Additionally, the study looks at different seed storage techniques and talks about how important they are for long-term conservation initiatives.

**Keywords**: Biodiversity preservation, Ecological restoration, seed bank

## INTRODUCTION

A seed bank is a structure or holding area created to preserve plant seeds for future generations. In the face of habitat loss, climate change, and overexploitation, seed banks are crucial to preserving genetic variety, which is necessary for plant species to survive. They guarantee the preservation of seeds from economically significant, rare, and endangered plants so that they can be reintroduced into ecosystems as needed (National Research Council, 1993). Furthermore, seed banks are an essential tool for reforestation, habitat restoration, and preserving agricultural biodiversity (Hawkins *et al*., 2007). By providing resistance to environmental disruptions, these collections can also act as insurance against the extinction of plant species in the future. Mainly 3 types of seed bank such as Ex Situ Conservation Seed Banks**,** In Situ Seed Banks and Community Seed Banks

### Significance of Seed bank

By preserving genetic variety and storing plant seeds, seed banks aid in the preservation of uncommon and endangered plant species. Seed banks help protect species that might be endangered by habitat destruction, climate change, and human activity by preserving seeds of native plants (Smith *et al*., 2003). In ecological restoration, they are crucial to efforts to restore habitat, particularly in regions impacted by land degradation, desertification, and deforestation. The seeds required for grassland rehabilitation, wetlands restoration, and reforestation can be obtained via seed banks (FAO, 2021). The agricultural sustainability also based on seed banks, it promotes sustainable agricultural methods by keeping a variety of crop seed collections, especially traditional and indigenous types. These cultivars are resistant to pests and diseases and are well suited to regional climates (Harlan, 1992). Thus, by offering a resource for robust crops, seed banks support food security (Lamb, 2017). Seed banks are essential for preserving seeds from species that can withstand drought and flooding, as climate change intensifies extreme weather events. (According to Robinson *et al*.2018), these seeds are crucial for bolstering

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agriculture's and ecosystems' resistance to shifting climatic trends. This study was conducted in Gujarat, India's Nana Asrana, Mahuva, Bhavnagar, which has a variety of ecosystems, including wetlands, grasslands, woodlands, riverbanks, desert areas, and agricultural plains. With rare species that represent both arid and semi-arid environments, the region is biologically rich. In order to support the larger goals of biodiversity conservation and sustainable land management, the study focuses on the gathering of seeds from these diverse habitats.

## MATERIALS AND METHODS

### Study Sites

The natural richness of the area was taken into consideration when choosing the study locations. An excellent place to study seed variety across different habitats is Nana Asrana, Mahuva, Bhavnagar, which offers a diverse range of coastal plains, dry zones, and agricultural fields. The area's plant species' biological richness and significance offered a solid foundation for seed collection, which is essential to the goals of the study.

### Seed collection and documentation

The gathering of mature and viable seeds, seed collecting was done during each ecosystem's busiest time of year. The name of the plant species, the kind of environment, and the growth conditions were all included in the complete information labeled on each seed sample. Geographic coordinates and environmental information were also labeled. To prevent contamination, all seeds were put in the proper containers, like glass jars or paper envelopes (Lamb,2017;Sharma *et al*.,2020;Smith *et al*.,2003).

**Fig 1a Map of Gujarat**

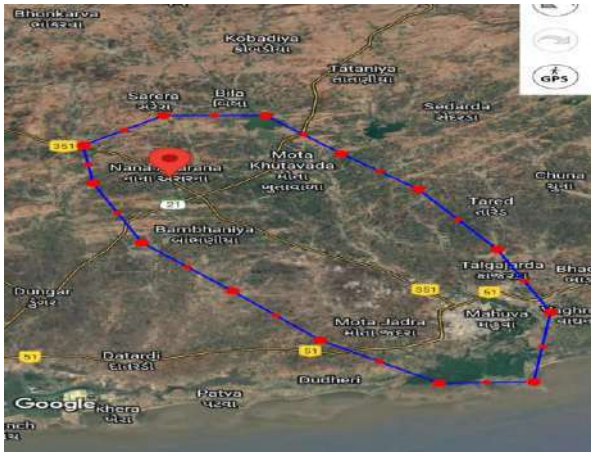


**Fig 1b Map of Mahuva (Nana Asarana)**

### Seed storage techniques

After being gathered, the seeds were kept in a number of ways:

1.Dry storage: Seeds were stored in glass containers and plastic bottles, clay pots to keep them dry and stop them from absorbing moisture.

2.Desiccants: To further lower humidity and preserve seed viability, silica gel and other desiccants were employed

3.Cold storage: To ensure their long-term preservation, some seeds—especially those from delicate species—were kept in storage at temperatures between 4°C and -20°C.

**Fig.2 Seed collection and stored**

## RESULT AND DISCUSSION

The natural seed variety was collected in various environments in Nana Asarana, Mahuva, Bhavnagar (Gujarat, India). This area is perfect for researching seed collection and conservation since it offers a distinctive blend of semi-arid regions, coastal plains, productive farmlands, and forest sections. Throughout the fieldwork, I saw how the indigenous vegetation adjusts to a variety of environmental circumstances, from the dry, sandy expanses of desert-like regions to the lush riverbanks.

| No | Scientific Name | Family | Common Name | Type |
|---|---|---|---|---|
| 1 | *Abelmoschus esculentus* L. (Okra) | Malvaceae | Bhindi | Herb |
| 2 | *Abelmoschus manihot* (L.) | Malvaceae | Jangali Bhindi | Shrub |
| 3 | *Abrus precatorius* L. | Fabaceae | Chanothi | Climber |
| 4 | *Abutilon indicum* (L.) | Malvaceae | Indian Mallow | Shrub |
| 5 | *Acacia concinna* DC. | Mimosaceae | Shikakai | Tree |
| 6 | *Achyranthus aspera* L. | Amaranthaceae | Aghedo | Herb |
| 7 | *Adansonia digitata* L. | Malvaceae | Rukhdo | Tree |
| 8 | *Albizia lebbeck* (L.) Benth. | Fabaceae | Siris | Shrub |
| 9 | *Alkanna tinctoria* (L.) Tausch | Boraginaceae | Ratanjyot | Small Tree |
| 10 | *Allium ceppa* (L.) | Amaryllidaceae | Onion | Herb |
| 11 | *Alternanthera sessilis* (L.) R. Br. Ex DC. | Amaranthaceae | Sessile Joyweed | Herb |
| 12 | *Amaranthus faudatus* (L.) | Amaranthaceae | Rajgira | Herb |
| 13 | *Anethum graveolens* (L.) | Apiaceae | Dill Weed | Herb |
| 14 | *Annona squamosa* L. | Annonaceae | Sitafal | Tree |
| 15 | *Antigonon leptopus* Hook & Arn. | Buckwheat | Icecream Well | Climber |
| 16 | *Arachis hypogaea* L. | Fabaceae | Moongphali | Herb |
| 17 | *Bignonia fluviatilis* Aubl. | Bignoniaceae | Pink Poul | Tree |
| 18 | *Bixa orellana* L. | Bixaceae | Sinduri | Small Tree |
| 19 | *Brassica juncea* L. | Cruciferae | Rai (Mustard) | Herb |
| 20 | *Bryonia laciniosa* Linn. | Cucurbitaceae | Shivlingi | Climber |
| 21 | *Cajanus cajan* (L.) | Fabaceae | Tuver, Pigeon Pea | Shrub |
| 22 | *Capsicum annum* L. | Solanaceae | Chilli | Herb |
| 23 | *Carica papaya* Linn. | Caricaceae | Papaya | Small Tree |
| 24 | *Cassia fistula* L. | Fabaceae | Garmalo | Tree |
| 25 | *Ceiba pentandra* (L.) Gaertn. | Malvaceae | Safed-Shimlo | Tree |
| 26 | *Cicer arietinum* L. | Fabaceae | Chana | Herb |
| 27 | *Cleome viscose* L. | Cleomaceae | Pili Talavani | Herb |
| 28 | *Clerodendrum aculeatum* (L.) Schltdl | Fabaceae | White Chana | Herb |
| 29 | *Corchorus olitorius* L. | Malvaceae | Nalta Jute | Shrub |
| 30 | *Corchorus tridens* L. | Malvaceae | Horn Fruited Jute | Herb |
| 31 | *Coriandrum sativum* L. | Apiaceae | Dhania (Coriander) | Herb |
| 32 | *Cucumis callosus* (Rottl.) | Cucurbitaceae | Kothimba | Climber |
| 33 | *Cuminum cyminum* Linn. | Apiaceae | Jeera (Cumin) | Herb |
| 34 | *Cyamopsis tetragonoloba* (L.) | Fabaceae | Guvar | Shrub |
| 35 | *Delonix regia* (Hook.) | Fabaceae | Gulmohar | Tree |
| 36 | *Dolichos lablab* (L.) | Fabaceae | Indian Bean | Climber |
| 37 | *Ehretia laevis* Roxb. | Boraginaceae | Dantranga | Small Tree |
| 38 | *Emblica officinalis* Linn. | Phyllanthaceae | Amla | Tree |
| 39 | *Foeniculum vulgare* P. Mill.) | Apiaceae | Saunf (Fennel) | Herb |
| 40 | *Gossypium arborium* L. | Malvaceae | Cotton | Shrub |
| 41 | *Hibiscus micranthus L.f.* | Malvaceae | Tiny Flower Hibiscus | — |
| 42 | *Hyptis suaveolens (L.)* | Lamiaceae | Bushmint | Shrub |

| | | | | |
|---|---|---|---|---|
| 43 | *Indicum nigrum Linn.* | Pedaliaceae | Black Til | Herb |
| 44 | *Indigofera suffruticosa Mill.* | Fabaceae | Indigo | Herb |
| 45 | *Indigofera tictonia L.* | Fabaceae | True Indigo | Herb |
| 46 | *Ipomoea obscura (L.)* | Convolvulaceae | Morning Glory | Climber |
| 47 | *Ipomoea pestigridis (L.)* | Convolvulaceae | Tiger's Toot | Herb |
| 48 | *Ipomoea triloba L.* | Convolvulaceae | Morning Glory | Herb-Shrub |
| 49 | *Leptadenia reticulata (Retz.) & Arn.* | Apocynaceae | Malti Dodi | Shrub |
| 50 | *Leycaena leucocephala Lamk.* | Fabaceae | Subabul | Small Tree |
| 51 | *Linum usitatissimum L. (Flax)* | Linaceae | Alsi (Flax) | Herb |
| 52 | *Luffa acutangula (L.)* | Cucurbitaceae | Turia | Climber |
| 53 | *Malvastrum coromandelianum (L.)* | Malvaceae | Falls-Mallow | Herb |
| 54 | *Manilkara hexandra dubard (Roxb.)* | Sapotaceae | Rayan | Tree |
| 55 | *Martynia annua L.* | Martyniaceae | Kaknasa, Vinchchuda | Herb |
| 56 | *Mitragyna parvifolia Roxb.* | Rubiaceae | Kadamb | Tree |
| 57 | *Momordica charantia L.* | Cucurbitaceae | Karela | Climber |
| 58 | *Morinda citrifolia (L.)* | Rubiaceae | Noni | Tree |
| 59 | *Mukia maderaspataanus (L.)* | Cucurbitaceae | Mukia | Climber |
| 60 | *Murraya koenigii L.* | Rutaceae | Curry Leaf Tree | Tree |
| 61 | *Ocimum basilicum L.* | Lamiaceae | Basil, Damro | Herb |
| 62 | *Ocimum sanctum L.* | Lamiaceae | Tulsi | Herb |
| 63 | *Peltophorum pterocarpum (DC.)* | Fabaceae | Tamrshing | Tree |
| 64 | *Pennisetum glaucum (L.) R Br.* | Poaceae | Bajra | Herb |
| 65 | *Pergularia daemia (Forssk.)* | Apocynaceae | Uttran, Uthamani | Climber |
| 66 | *Phoenix ductylifera L.* | Arecaceae | Khajuri | Tree |
| 67 | *Pithecellobium dulce (Roxb)Benth.* | Fabaceae | Manila Tamarind | Tree |
| 68 | *Pongamia pinnata (L.)* | Fabaceae | Karanj | Tree |
| 69 | *Prosopis juliflora (Sw.) DC.* | Momosaceae | Gando Baval | Tree |
| 70 | *Psoralea corylifolia L.* | Fabaceae | Bavchi | Herb |
| 71 | *Putranjiva roxburghii (Wall.)* | Putranjivaceae | Putranjiva | Tree |
| 72 | *Rhynchosia minima (L.) DC.* | Fabaceae | Jumby-Bean | Climber |
| 73 | *Ricinus communis L.* | Euphorbiaceae | Castor Bean | Shrub |
| 74 | *Sapindus trifoliatus L.* | Sapindaceae | Soapnut | Tree |
| 75 | *Schleichera oleosa (Lour.) Oken* | Sapindaceae | Kusum | Tree |
| 76 | *Semecarpus anacardium Linn.* | Anacardiaceae | Bhilawa | Tree |
| 77 | *Senna occidentalis L.* | Fabaceae | Coffee Senna | — |
| 78 | *Senna tora L.* | Fabaceae | Sinhala | Herb |
| 79 | *Sesamum indicum L.* | Pedaliaceae | White Til | Herb |
| 80 | *Sesbania grandiflora (L.) Poir.* | Fabaceae | Agathiyo | Tree |
| 81 | *Setaria italic (L.) Beauv.* | Poaceae | Kangani | Herb |
| 82 | *Solanum lycopersicum L.* | Solanaceae | Tomato | Herb |
| 83 | *Sorghum bicolor (L.)* | Poaceae | Jowar | Herb |
| 84 | *Tecoma stans (L.) Juss.ex Kunth* | Bignoniaceae | Yellow Elder | Shrub |
| 85 | *Tecomella undulate (Sm) Seem.* | Bignoniaceae | Rohida | Tree |
| 86 | *Tectona grandis L.f.* | Lamiaceae | Teak | Tree |
| 87 | *Tephrosia purpurea (L.) Pers.* | Fabaceae | Purple Tephrocia | Herb |
| 88 | *Tephrosia villosa (L.) Pers.* | Fabaceae | Wild Indigo, Sarpankho | Herb |
| 89 | *Terminalia arjuna (Roxb.) Wight & Arn.* | Combretaceae | Arjun | Tree |

| | | | | |
|---|---|---|---|---|
| 90 | *Terminalia bellirica (Gaertn.) Roxb.* | Combretaceae | Bahera | Tree |
| 91 | *Trachyspermum ammi (L.)* | Apiaceae | Ajwain | Herb |
| 92 | *Tribulus terrestris L.* | Zygophyllaceae | Gokhru | Herb |
| 93 | *Tridax procumbens (L.)* | Asteraceae | Cotbatans | Herb |
| 94 | *Trigonella foenum-graecum L.* | Papilionaceae | Methi | Herb |
| 95 | *Triumfetta rhomboidea Jacq.* | Malvaceae | Diamond Barbark | Shrub |
| 96 | *Vicia faba L.* | Fabaceae | Broad Bean | Herb |
| 97 | *Vigna mungo (L.)* | Fabaceae | Udad | Herb |
| 98 | *Vigna radiate (L.) R.* | Fabaceae | Mung | Herb |
| 99 | *Vigna unguiculata subsp.* | Fabaceae | Choli, Long Bean | Climber |
| 100 | *Waltheria indica L.* | Malvaceae | Sleepy Morning | Herb |
| 101 | *Xanthium strumarium l.* | Asteraceae | Gadardi | Herb |
| 102 | *Zea mays L.* | Poaceae | Maize (Corn) | Herb |
| 103 | *Ziziphus jujube Mill.* | Rhamnaceae | Jujube, Bordi | Shrub |

The existence of native plants that flourish in spite of severe weather conditions was one of the most important findings. I discovered traditional crop kinds that have been grown for many generations in agricultural fields, and I discovered a number of tree species that are essential to maintaining ecological balance in wooded areas. Numerous aquatic and semi-aquatic plants, which are crucial for stabilizing soil and conserving water, were found in wetlands and along riverbanks. In addition to assisting me in gathering and categorizing a wide variety of seeds, this research expanded my knowledge of the ways in which these plants support regional biodiversity, soil health, and environmental sustainability. More than 100 seeds samples in all were successfully gathered and arranged into different plant families. The biological roles of the various habitat types—grasslands, woods, marshes, deserts, and agricultural lands—were used to categories the seeds. The ecological relevance of these seeds and their possible application in restoration initiatives were investigated (Jodha, 2005; Singh *et al*., 2012; Noble *et al*., 2013; Tockner & Stanford, 2002).

## CONCLUSION

Numerous plant species that support agriculture, ecology, and traditional medicine were discovered throughout the study. The gathered seeds came from a variety of types, such as drought-resistant species, fodder crops, medicinal plants, and nutrient-rich grains. The following are some important plant groups and their meanings (Hawkins *et al*., 2007; Smith *et al*., 2003; Robinson *et al*., 2018). Ragi (Eleusine coracana) and Bajra (Pennisetum glaucum), two millets renowned for their high nutritional content and resistance to drought, were gathered. These grains are an important dietary source in dry areas because they are high in fiber, iron, and necessary amino acids. Because of their deep roots, they also contribute to soil conservation by halting erosion. In agricultural lands, a variety of pulses and legumes were discovered, including Chana (Cicer arietinum), Kathol (Lablab purpureus), and Moong (Vigna radiata). These legumes are frequently sprouted for human consumption and are high in protein. They are useful for sustainable farming since they also improve soil fertility by fixing nitrogen

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