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## Aromatic plants diversity showing their propagation by seeds for *ex-situ* conservation in herbal garden

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### Abstract

Seeds are known as fertilized to mature ovules which include an embryo in resting phase. When it gets favorable environmental condition embryo starts to grow and further convert into a new plant like their parent plants. This paper is for the study of Aromatic plants which are propagating through their seeds. There is a great variation in plants out of them, some are marked as Aromatic plants due to the presence of certain aroma.

26 Aromatic plants which seeds are efficiently producing new individuals and are listed with their information like Botanical Name, Common Name, Habit, Propagation, Propagation mode are given for individual plant species in Tables. Their propagation is aimed not only for the generation of new individuals, but also for their ex-situ conservation in the Herbal Garden.

**Keywords:** Aromatic plants, Seed, Propagation, Ex-situ conservation, Herbal Garden.

### 1. Introduction

Aromatic plants are a group of the plants with the presence of a particular type of aroma and its concentrations, types are remarkable as well as variable among the plants. Aroma concentration in the various parts of the specific plants also affected by plant ages and local environmental condition and regulated by their own genetic makeup. Aromatic plants are not only a source of aroma, but also useful for treatment of various disorders. A therapy used for treatment of certain disorder by utilizing aromatic plants is referred as Aromatherapy and is as old as the human civilization.

These are important components of the vegetation composition of the different parts of the world. Bioactivity of the various aromatic plants is differing among the plants with their age and concentrations. Harney <sup>[4]</sup> studied on Ethno-medicinal Plants Diversity of Bhadravati Tahsil of Chandrapur District, Maharashtra, India. Puranik <sup>[12]</sup>, Pocchi <sup>[10]</sup>, Zingare <sup>[15]</sup> etc researchers made study on Ethno-medicinal plant diversity, uses, and conservation in different locations of the world.

Study on Biodiversity and conservation of medicinal and aromatic plants in Africa made by Okigbo *et al* <sup>[9]</sup>. Aromatic plants include strong smell properties (King <sup>[7]</sup>). Ex-situ conservation is a type of conservation of outside of the natural habitat of the plants/animals Roche <sup>[13]</sup>.

Posey <sup>[11]</sup> studied on Traditional Knowledge, Conservation and the Rain Forest Harvest. Medicinal and Aromatic Plants as Global resources as marked by Heywood <sup>[5]</sup>. Heywood <sup>[6]</sup> focused on Botanic Gardens and the conservation of medicinal plants. Medicinal and Aromatic plants diversity of Asteraceae in Uttarakhand assessed by Bisht and Purohit <sup>[2]</sup>. Thanos *et al* <sup>[14]</sup> recorded Eco-physiology of germination in the aromatic plant thyme, savory and oregano (Labiatae). Cultivation of medicinal plants in developing nations: means of conservation and poverty alleviation carried out by Amujoyegbe *et al* <sup>[1]</sup>. Murray <sup>[8]</sup> recorded the Healing Power of Herbs. Cultivation of medicinal plants also supports their conservation <sup>[3]</sup>.

### 2. Materials and Methods

Seeds are storage of new individuals of the Medicinal and Aromatic Plants. It develops into a new plant as their parental ones under favorable environmental condition. Seeds are variable in their size, shape, weight, colour etc. Seeds developing period and germination capacity are also varied among the plant to plant. For easily and high percentage of seed germination many methods are applied out of them one suitable method is that seeds tied with cotton clothes and deep in water over the night. It is helping the seeds to break their dormancy period.

Long time this practice may be harmful to the seeds.

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So, proper observation needed for its germination. Temperature, Light, Moisture etc level required to maintain during the above practices. These seeds were shown in prepared beds and covered with paddy straw for easily and fast germination of the Medicinal and Aromatic Plants in the Herbal Garden.

These were also protected from birds, High intensity of sunlight etc. Some plants were also developed in poly bags. In both cases developed plants were transferred to the field following better water supply and also other management essential for the newly developing plants.

### 3. Results & Discussion

A total of 26 Aromatic plants were propagated by using their seeds out of them some species of Aromatic plants were also introduced in developed form in the Herbal Garden. Mostly herbaceous plant seeds are grown in the field directly, but in the case of woody plants need for development of new plants by nursery method. When the new plantlets are capable to survive in the field are shifted to the field followed by proper care. All management strategies applied, which are needed for their successfully development of the new individuals of the Aromatic plants.

Some plants like *Aegle marmelos*, *Lawsonia inermis*, Citrus, Murraya etc need for development in the nursery practice, whereas the rest of the studied plants can be grown directly in the prepared beds in the field of the Herbal Garden with proper water, Weed, Nutrient etc management. Table - 2 showing family wise variation in Medicinal and Aromatic plants, including habit diversity of various Aromatic plants separately. There are 18 species of the herbs, 03 under shrub and 05 tree species of the Aromatic plants were introduced by their direct collection or by propagation using seeds. Aromatic plants like *Anisomeles indica* Linn., *Blumea*, *Coleus*, *Eryngium*, *Hyptis*, *Ocimum* species, *Tagetes* etc are efficiently registered as their propagation through their seeds as well as stem cuttings in favorable environmental condition. *Cymbopogon*, *Vetiveria* are also propagated by their adventitious root buds by its separation these plants multiplied rapidly by providing the necessary facilities.

Some plant species like *Cinnamomum*, *Eliocarpus*, *Clerodendron*, *Santalum album* are directly introduced in Herbal Garden for their ex-situ conservation. Spreading of the seeds takes place by natural and manmade both methods and is an important aspect for in situ as well as ex-situ conservation of the Medicinal and Aromatic plants.

**Table 1:** List of the Aromatic plants introduced in Herbal Garden which performing their propagation by seeds.

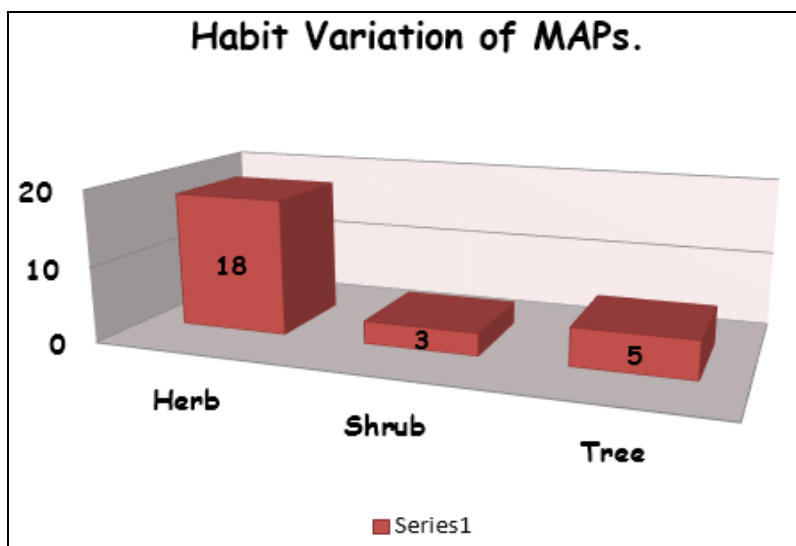
1.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Aegle marmelos</i> (L.) Corr.</b></li> <li>➤ Common Name – Bael</li> <li>➤ Family – Rutaceae</li> <li>➤ Habit – Tree</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
2.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Anisomeles indica</i> Linn.</b></li> <li>➤ Common Name – Indian catmint,</li> <li>➤ Family –Lamiaceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed/Stem cutting</li> <li>➤ Propagation Mode – Poly bags/Field</li> </ul>
3.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Blumea lacera</i> (Burm.F.) DC.</b></li> <li>➤ Common Name – Kakronda</li> <li>➤ Family – blume, aceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode - Poly Bags/Field</li> </ul>
4.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Cinnamomum tamala</i> (Buch. Ham) T. Nees &amp; C.H. Eberm.</b></li> <li>➤ Common Name – Tejpatta, Indian bay leaf</li> <li>➤ Family – Lauraceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
5.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Citrus lemon</i> (L.) Burm.F.</b></li> <li>➤ Common Name – Lemon</li> <li>➤ Family – Rutaceae</li> <li>➤ Habit – Shrub</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
6.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Clerodendrum macrosiphon</i> Hook.</b></li> <li>➤ Common Name – Macrosiphon, Morning Kiss</li> <li>➤ Family – Lamiaceae</li> <li>➤ Habit – Shrub</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
7.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Coleus forskohlii</i> (Willd.) Briq.</b></li> <li>➤ Common Name – Pattharchur</li> <li>➤ Family – Apiaceae</li> <li>➤ Habit – Herb</li> </ul>

	<ul style="list-style-type: none"> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Poly bags/ Field</li> </ul>
8.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Coriandrum sativum</i> Linn.</b></li> <li>➤ Common Name – Coriander</li> <li>➤ Family – Apiaceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
9.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Cymbopogon flexuosus</i> (Nees ex Steu) Wat.</b></li> <li>➤ Common Name – Lemongrass</li> <li>➤ Family – Poaceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
10.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Elaeocarpus ganitrus</i> Roxb.</b></li> <li>➤ Common Name – Rudraksh</li> <li>➤ Family – Elaeocarpaceae</li> <li>➤ Habit – Tree</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
11.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Eryngium foetidum</i> Linn.</b></li> <li>➤ Common Name – Wild Coriander</li> <li>➤ Family – Apiaceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Poly bags/ Field</li> </ul>
12.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Eucalyptus obliqua</i> L.</b></li> <li>➤ Common Name – Neelgiri</li> <li>➤ Family – Myrtaceae</li> <li>➤ Habit – Tree</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
13.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Foeniculum vulgare</i> Mill.</b></li> <li>➤ Common Name – Fennel</li> <li>➤ Family – Apiaceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
14.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Hyptis suaveolens</i> (L.) Poit.</b></li> <li>➤ Common Name – Jangali Tulsi,</li> <li>➤ Family – Lamiaceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
15.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Lawsonia inermis</i> Linn.</b></li> <li>➤ Common Name – Mehandi, Heena</li> <li>➤ Family – Lythraceae</li> <li>➤ Habit – Shrub</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
16.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Mimusops elengi</i> L.</b></li> <li>➤ Common Name – Bakul</li> <li>➤ Family – Sapotaceae</li> <li>➤ Habit – Tree</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
17.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Murraya Koenigii</i> Linn.</b></li> <li>➤ Common Name – Curry leaf</li> <li>➤ Family – Rutaceae</li> <li>➤ Habit – Shrub</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
18.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Ocimum basilicum</i> Linn.</b></li> <li>➤ Common Name – Basil</li> <li>➤ Family – Lamiaceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>

19.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Ocimum canum</i> Sims</b></li> <li>➤ Common Name – American Tulsi, Camphor Basil</li> <li>➤ Family – Lamiaceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
20.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Ocimum gratissimum</i> Linn.</b></li> <li>➤ Common Name – African Tulsi</li> <li>➤ Family – Lamiaceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
21.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Ocimum sanctum</i> Linn.</b></li> <li>➤ Common Name – Krishna Tulsi</li> <li>➤ Family – Lamiaceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
22.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Santalum album</i> L.</b></li> <li>➤ Common Name – Chandan</li> <li>➤ Family – Santalaceae</li> <li>➤ Habit – Tree</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
23.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Sesamum indicum</i> Linn</b></li> <li>➤ Common Name – Tilli</li> <li>➤ Family – Pedaliaceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
24.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Tagetes erecta</i> Linn</b></li> <li>➤ Common Name – Mexican Marigold</li> <li>➤ Family – Asteraceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
25.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name – <i>Tagetes patula</i> Linn</b></li> <li>➤ Common Name – French Marigold</li> <li>➤ Family – Asteraceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Field</li> </ul>
26.	<ul style="list-style-type: none"> <li>➤ <b>Botanical Name - <i>Vetiveria zizanioides</i> (L.) Nash</b></li> <li>➤ Common Name – Khas</li> <li>➤ Family – Poaceae</li> <li>➤ Habit – Herb</li> <li>➤ Propagation – Seed</li> <li>➤ Propagation Mode – Poly bags/Field</li> </ul>

Table 3: Habit Variation of Maps.

S. No.	Habit Type	Number of the Aromatic Plants
1.	Herb	18
2.	Shrub	03
3.	Tree	05
<b>Total</b>		<b>26</b>



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