

## Exploration of ornamental plants of medicinal value around Chapra (Saran) Bihar, India

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### ABSTRACT

Ornamental plants are grown in home gardens or in public places for their aesthetic value and developing a positive environment around surroundings for human well beings. These plants are receiving attention in recent times for their additional uses as medicinal purposes. Current study has been proposed to explore the medicinally important diversity of ornamental plants around Chapra, district Saran, Bihar. A total of 102 ornamental plants belonging to 38 genera and 38 families were recorded from study area of Saran district. Out of 102, 50 plants were represented by annual, 24 by biennial and 28 by perennial ornamental plants. Furthermore, it was observed that annual, biennial and perennial ornamental plants were dominated by *Chrysanthemum* sp. *Cosmos* sp. and *Rosa hybrida* respectively, belonging to family Asteraceae around study area. It is noteworthy to mention here that these plants are used by local people for various purposes such as medicine, food, decoration etc. Finally, it may be concluded that exploration of plants particularly ornamental plants is urgent need of the present-day biotechnological programme for their exploitation directed towards environmental supportive developmental processes for human well-beings and for conservation of these valuable plants for sustainable development.

**Key Words** - Aesthetic value; Conservation; Exploration; Medicine; Ornamental Plants.

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### INTRODUCTION

Ornamental plants respond to local botanical knowledge that guides diverse strategies of cultivation and consumption in different cultural contexts. Such plants are grown or maintained for its aesthetic features like its colour, fragrance, attractive pattern or design (Jamia, 2006). These plants are grown in gardens or public places for decorative purposes and landscape design projects, such as house plants for their beautiful cut flowers and specimen display ((Kumar *et al.*, 2005; Oloyede, 2012). Attractive pattern, colour and texture of stems, leaves, flowers and fruits of ornamental plants are responsible for maintaining the scenario naturally beautiful and attractive (Ready and Ready

2012). Not only this, the popularization and plantation of such beautiful and medicinally important plants at personal and public places are supporting the current approach of conservation of endogenous species of plants in their natural habitats (Oloyede, 2012). Some of the commonly used ornamental plants are rose, lilies, orchids, coleus, ferns etc. Ornamental plants may belong to herbs, vines, bushes, and trees and may be annual, biennial and perennial. The ornamental plants add various colour to either kind of garden and can be used as cut flowers in vases. The cut flowers from ornamental plants can fetch us economic benefits as they are used in various floral arrangements (Kensa and Mary 2014).

Ornamental plants are importantly grown for display purposes, rather than functional ones. Some plants are both ornamental and functional such as Ornamental plants are the keystone of gardening, and they come in a range of shapes, sizes and colors suitable to a broad array of climates, landscapes, and gardening needs (Arora, 1993). Many ornamental plants are chosen because they appeal to the sense of smell, in addition to their visual appeal. Ornamental plants are grown for decorative purposes in gardens, home gardens, landscape design projects, squares, parks, street trees, indoor plants, and cut flowers. The decorative purposes respond to aesthetic values assigned by people in different cultural contexts, e.g., in western culture usually, that are related to some plant features: flowers, fruits, leaves, foliage texture, color, and scent (Oloyede, 2012; Estrada-Castillón *et al.*, 2014).

Landscape gardening and bio-aesthetic planning is receiving attention worldwide to establish ecofriendly human habitats by beautifying the natural scenario (Riaz and Javaid 2007). Recent development in studies of ornamental plants have revealed that ornamental plants are valuable sources of various pharmaceutical products and can be grown at large scale to generate monetary benefit (Asati and Yadav 2010). The importance of ornamental plants as food, fiber, fuel, medicine and timbers are already in literature (Kumar *et al.*, 2005; Kumbhar and Dabgar 2014). For example, *Ficus pseudopalma* is ornamental plants and used by local people as food and medicine (Santiago *et al.*, 2014). Less frequently, ornamental plants are considered as important as other useful plants (Estrada-Castillón *et al.*, 2014). Ornamentals sometimes constitute a starting point to evaluate its food, medicinal, and/or toxic properties (Maroyi, 2012; Radji and Kokou 2014). Some ornamental flowers are analyzed as source of nutrients and nutraceuticals (Mlcek and Rop 2011), and the aesthetic values of the edible flowers (color, scent) are subordinated to the alimentary and medicinal uses. Less often, the situation is the opposite: the ornamental meaning of certain medicinal plants is evaluated (Sharma *et al.*, 2014).

Based on the life cycle, ornamental plants have been classified into Annuals, Biennial and Perennial. Annuals Plants that complete their life cycles within one year or one growing season are called annuals. Seeds of annuals germinate and develop stems, leaves, roots, flower, and seeds within a year and then die. Biennials are plants that normally require two growing seasons i.e. around two years to produce flowers and seeds before dying. In the first growing season, biennials grow vegetatively and develop root and shoot. In the fall, they go dormant and rest until the following spring. During the winter months, they receive a required cold treatment. Growth is resumed in the spring of the second season. The plants bolt, flower, produce seed, and die. This group of plants is fewer in number than the other two groups such as annuals and perennials, classified by their lifecycles. Perennials are plants that have life cycles of more than two growing seasons. Perennial plants may take a few years too many years to reach reproductive maturity. They may be woody, like trees and shrubs, or herbaceous. These plants gave us food, air and energy.

Fresh air generates the home with fresh energy and helps to breathe free. These lovely plants bring fresh air and purity apart from enhancing the beauty of home. They are supposed to bring good luck to you and your family. These ornamental garden plants are grown for the enjoyment of gardeners, visitors, and the public. The ornamental plants not only provide a pleasing aroma but also keep away outdoor pests, such as ants, mosquitoes, and flies (Rubanga *et al.*, 2011). Some of the plants such as lavender and roses bring out a pleasing fragrance, whereas other ornamental plants such as spider plant, golden pothos, peace lily, snake plant, and several species of Philodendron and Dracaena produce certain volatile organic compounds viz. formaldehyde, trichloroethylene and benzene to improve indoor air quality and also detoxify smoke from tobacco (Chairat and Paitip 2012). Most importantly, rapid environmental changes due to anthropogenic activities are threatening the survival of plants resulting into extinction of several species of environmental and

medicinal significance (Drummond and Strimmer 2001). Considering the significance of ornamental plants in human life and their role in beautifying the natural scenario, present work of exploration of ornamental plants of unexplored area of Saran district especially around Chapra is proposed. This study will help in maintaining the diversity of ornamental plants by their plantation in households, garden etc. and to protect them from extinction due to overpopulation of human beings and resulting anthropogenic activities (Subhashini and George 2011).

## MATERIAL & METHODS

### Study Area

Saran - a district of Bihar - is situated in the Northern part of India. The Saran lies between 25°36' and 26°13' N latitude and 84°24' and 85°15' E longitude in the Southern post of North Bihar. Saran occupies an area of 2,641 square kilometers. It is surrounded by the Ganga River provides the Southern boundary of the district, beyond which lie the districts of Bhojpur and Patna. To the north of Saran lie the districts of Siwan and Gopalganj. The Gandak River forms the dividing line with the Vaishali and Muzaffarpur districts in the east. Using field investigation in combination with analysis of relevant literature and available data, the present study will include the botanical exploration and investigation of cultivated and wild ornamental plants of the Saran district. There is an abundance of wild and cultivated ornamental plants in district Saran and exhibits a wide range of diversity in terms of taxa, habit, and growth forms.

### Floristic exploration

Floristic explorations and taxonomic studies were conducted during the year 2020-2022. Taxonomic identification, and documentation and ornamental characterization of each species were recorded on floral art. The methodology used is based on observation method for the determination of flora. All the specimens collected were identified with the help of recent literature on local floras authored by Hasan and Rahma (2021), Gamble and Fisher (1956), Henry *et al.*, (1989) and Mathew (1999).

Also, Haines Flora was consulted for identification of plants recorded at different sites of study.

## RESULT & DISCUSSION

Study sites provided interesting results about floristic diversity of the ornamental plants. A total of 102 ornamental plants are recorded in this study area (Table-1, 2 and 3). Out of 102, 50 (49%) were presented by annuals (Table 1), 24 (23.53%) by Biennials (Table 2) and 28 (27.45%) by perennials (Table 3). The photograph of annuals especially their floral parts are presented in plate 1a, 1b and 1c, biennials in plate 2 and perennials in plate 3.

Landscape gardening and bio-aesthetic planning are receiving more attention globally for establishment of ecofriendly human habitats. Documentation of flora of different region is the urgent need of the present-day sustainable development programme. The recent biotechnological approach for human development requires gene pool which can only be maintained by documentation and their popularization among local people for their plantation in their garden. Present study of exploration of ornamental plants diversity may prove to be fruitful in conservation of ornamental species viz. endemic, rare and endangered species of ornamental interest.

Recent developments have suggested the significance of ornamental plants in economic growth, particularly generation of income among poor, along with environmental cleaning. Ornamental plants are also supporting economic growth of the country by export of the ornamental plants and their product (Francini, 2022). Ornamental species are also the sources of the pharmaceutical product frequently used as medicinal significance (Asati and Yadav 2010). Ornamental plants are used in its broadest sense for decorative purposes in gardens, home gardens, landscape design projects, squares, parks, street trees, indoor plants, and cut flowers (Segum and Ademola 2008). The decorative purposes respond to aesthetic values assigned by people in different cultural contexts, e.g., in Western culture usually, that are related to some plant features such as flowers, fruits, leaves, foliage texture, color, and

scent (Oloyede, 2012, Estrada-Castillón *et al.*, 2014). The importance of plants as food, medicine, fiber, fuel, timber, and others often has been considered and explored by many researchers, but the aesthetic dimension was not very much analyzed (Kumar *et al.*, 2005; Kumbhar and Dabgar 2014).

In some studies, the ornamental use is indicated but explicitly relegated to a secondary position regarding its medicinal and food uses. For example, *Ficus pseudopalma* is an endemic medicinal plant with great ethno botanical applications. Aside from being an ornamental plant, it is also being consumed as “food and medicine” (Santiago *et al.* 2014). Less frequently, ornamental plants are considered as important as other useful plants

(Estrada-Castillón *et al.*, 2014). Ornamentals sometimes constitute a starting point to evaluate its food, medicinal, and/or toxic properties (Maroyi, 2012) and (Radji and Kokou 2014). Some ornamental flowers are analyzed as source of nutrients and nutraceuticals (Mlcek and Rop 2011), and the aesthetic values of the edible flowers (color, scent) are subordinated to the alimentary and medicinal uses. Less often, the situation is the opposite: the ornamental meaning of certain medicinal plants is evaluated (Sharma *et al.*, 2014). Furthermore, it was observed that members of family Asteraceae viz. *Chrysanthemum* sp., *Cosmos* sp. and *Rosa hybrida* representing annual, biennial and perennial ornamentals plants were predominantly present around the study area.

**Table 1- Lists of dominant genus of Annuals Dicot and monocot ornamental plants around Chapra.**

Sl. No.	Plants Name (Local name)	Scientific Name	Dicot/ Monocot	Family	Plant parts used
1.	Balsam sp	<i>Impatiens balsamina</i>	Dicot	Balsaminaceae	Flower
2.	Pitunia sp.	<i>Pitunia grandiflora</i>	Dicot	Solanaceae	Leaf, callus
3.	Marigold sp	<i>Tagetes</i>	Dicot	Asteraceae	Leaf
4.	Zinnia sp	<i>Zinnia elegans</i>	Dicot	Asteraceae	Leaves, flower
5.	Touch-me- not sp	<i>Mimosa pudica</i>	Dicot	Fabaceae	Leaves
6.	Cosmos sp	<i>Cosmos bipinnatus</i>	Dicot	Asteraceae	Leaves
7.	Snapdragons sp	<i>Antirrhinum majus</i>	Dicot	Plantaginaceae	Leaves, flower
8.	Common sunflower	<i>Helianthus annuus</i>	Dicot	Asteraceae	Seed
9.	Salvia	<i>Salvia officinalis</i>	Dicot	Laminaceae	Leaves
10.	Dahlia	<i>Dahlia pinnata</i>	Dicot	Asteraceae	Root
11.	Corn flower	<i>Centaurea cyanus</i>	Dicot	Asteraceae	Dried Flower
12.	Chrysanthemum	<i>Chrysanthemum indicum</i>	Dicot	Asteraceae	Flower
13.	Nasturtium	<i>Tropaeolum majus</i>	Dicot	Tropaeolaceae	Leaves
14.	Periwinkle	<i>Catharanthus roseus</i>	Dicot	Apocynaceae	Root & leaves
15.	Calibrachoa	<i>Calibrachoa hybrid</i>	Dicot	Solanaceae	Flower
16.	Pot marigold	<i>Calandula officinalis</i> L	Dicot	Asteraceae	Flower petals
17.	Angolenia	<i>Angelonia angustifolia</i>	Dicot	Plantaginaceae	Aerial parts
18.	Transvaal daisy	<i>Gerbera jamesonii</i>	Dicot	Asteraceae	Leaf
19.	Curly kale	<i>Brassica oleracea</i> var. <i>sabellica</i>	Dicot	Brassicaceae	Leaf
20.	Lobelias	<i>Lobelia inflata</i>	Dicot	Companulaceae	Above ground parts
21.	<i>Impatiens</i> sp	<i>Impatiens walleriana</i>	Dicot	Balsaminaceae	Leaves, stem, root
22.	<i>Ageratum</i> sp	<i>Ageratum houstonianum</i>	Dicot	Asteraceae	Leaves, stem
23.	<i>Vervain</i> sp	<i>Vervena officinalis</i>	Dicot	Verbenaceae	Whole plant
24.	Silver ragwort	<i>Jacobaea maritima</i>	Dicot	Asteraceae	Root, flower
25.	<i>Caladium</i> sp	<i>Caladium tuberosum</i>	Dicot	Araceae	Leaf
26.	<i>Phlox</i> sp	<i>Phlox peniculata</i>	Dicot	Polamoniaceae	Leaf and Root
27.	Larkspur sp	<i>Delphinium elatum</i>	Dicot	Ranunculaceae	Seed
28.	Common sage	<i>Salvia officinalis</i>	Dicot	Lamiaceae	Leaf
29.	Snapdragon	<i>Antirrhinum majus</i>	Dicot	Plantaginaceae	Leaves, Flower
30.	Stocks sp	<i>Matthiola incana</i>	Dicot	Brassicaceae	Root, Bark, Fruit, Leaves
31.	Coneflowers	<i>Echinacea purpurea</i>	Dicot	Asteraceae	Leaves, Seed
32.	Crane's bill	<i>Geranium dissectum</i>	Dicot	Geraniaceae	Root
33.	Begonia	<i>Begonia oblique</i>	Dicot	Begoniaceae	Leaves



Continued.....

34.	California poppy	<i>Eschscholzia sp.</i>	Dicot	<i>Papaveraceae</i>	Aerial parts
35.	Daisy family	<i>Bellis perennis</i>	Dicot	<i>Asteraceae</i>	Aerial parts
36.	French marigold	<i>Tagates patula</i>	Dicot	<i>Asteraceae</i>	Flower, Seed, Petals, Roots
37.	Primrose	<i>Primula vulgaris</i>	Dicot	<i>Primulaceae</i>	Stem, leaves
38.	Aster	<i>Aster amellus</i>	Dicot	<i>Asteraceae</i>	Whole parts
39.	Lantanas	<i>Lantana camara</i>	Dicot	<i>Verbenaceae</i>	Leaves
40.	Alyssum	<i>Lobularia maritime</i>	Dicot	<i>Brassicaceae</i>	Seed Oil
41.	Garden cosmos	<i>Cosmos bipinnatus</i>	Dicot	<i>Asteraceae</i>	Leaves
42.	Sweet pea	<i>Lathyrus odoratus</i>	Dicot	<i>Fabaceae</i>	Leaves
43.	West Indian Jasmine	<i>Ixora coccinea</i>	Dicot	<i>Rubiaceae</i>	Root
44.	Pansy	<i>Viola x wittrockiana</i>	Dicot	<i>Violaceae</i>	Flower
45.	Hibiscus	<i>Hibiscus rosa-sinensis</i>	Dicot	<i>Malvaceae</i>	Flower, Leaves
46.	Evolvulus	<i>Morning glories</i>	Dicot	<i>Convolvulaceae</i>	Whole plant
47.	Drummond's phlox	<i>Phlox drummondii</i>	Dicot	<i>Polemoniaceae</i>	Seed
48.	African daisies	<i>Osteospermum sp.</i>	Dicot	<i>Asteraceae</i>	Aerial parts
49.	Coleus	<i>Coleous scutellarioides</i>	Dicot	<i>Laminaceae</i>	Root
50.	New Guinea impatiens	<i>Impatiens hawker</i>	Dicot	<i>Balsaminaceae</i>	Flower

Photographs of Annual dominant genus of Dicot and monocot ornamental plants around Chapra.

Plate: 1a





**Plate: 1b**



**Angolenia angustifolia**



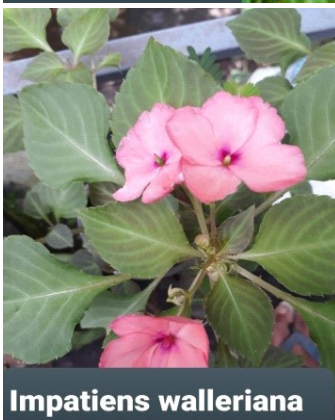
**Gerbera jamesonii**



**Brassica oleraceae**



**Lobelia inflata**



**Impatiens walleriana**



**Vervena officinalis**



**Ageratum houstonianum**



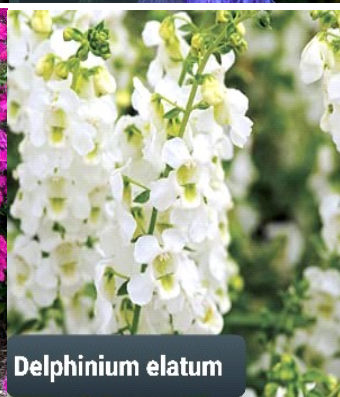
**Jacobaea maritima**



**Caladium tuberosum**



**Phlox peniculata**



**Delphinium elatum**



**Salvia officinalis**



**Antirrhinum majus**



**Matthiola incana**



**Echinacea purpurea**



**Geranium dissectum**



Plate: 1c





**Table 2- Lists of dominant genera of Biennials Dicot and monocot ornamental plants around Chapra**

Sl. No	Plants Name (Local name)	Scientific Name	Dicot/ Monocot	Family	Plant parts used
1.	Foxglove	<i>Digitalis purpurea</i>	Dicot	<i>Plantaginaceae</i>	Aerial parts
2.	Dahlia	<i>Dahlia pinnata</i>	Dicot	<i>Astraraceae</i>	Root
3.	Sweet willium	<i>Danthus barbatus</i>	Dicot	<i>Caryophyllaceae</i>	Flower
4.	Holly hock	<i>Alcea rosea</i>	Dicot	<i>Malvaceae</i>	Whole parts
5.	Black-eyed susan	<i>Ruudbeckia hirta</i>	Dicot	<i>Astreraceae</i>	Root, Leaves, Flower
6.	Scorpion grasses	<i>Myosotis stricta</i>	Dicot	<i>Boraginaceae</i>	Flower
7.	Canterbury bells	<i>Campanula medium</i>	Dicot	<i>Campanulaceae</i>	Flower
8.	Larkspur sp	<i>Delphinium consolida L</i>	Dicot	<i>Ranunculaceae</i>	Seed
9.	Day lilies sp	<i>Hemerocallis lilioasphodelus</i>	Monocot	<i>Asphodalaceae</i>	Flower
10.	Peony sp	<i>Paeonia suffruticosa</i>	Monocot	<i>Paeoniaceae</i>	Root
11.	Cosmos sp	<i>Cosmos bipinnatus</i>	Dicot	<i>Asteraceae</i>	Fruits and Aerial parts
12.	Cone flower	<i>Echinacea purpurea</i>	Dicot	<i>Asteraceae</i>	Root, Aerial parts
13.	Pansy sp	<i>Viola tricolor var. hortensis</i>	Dicot	<i>Violaceae</i>	Flowering parts
14.	Wall flower sp	<i>Erysimum cheiri</i>	Dicot	<i>Brassicaceae</i>	Leaves and Flower
15.	California poppy	<i>Eschscholzia California</i>	Dicot	<i>Geraniaceae</i>	Leaves, Bark Root, Fruits.
16.	Angelica sp	<i>Angelica archangelica</i>	Dicot	<i>Apiaceae</i>	Leaves, Seeds and Shoot
17.	Bell flower sp	<i>Campanula rapunculoides</i>	Dicot	<i>Campanulaceae</i>	Stamen
18.	Coral bells sp	<i>Heuchera americana</i>	Dicot	<i>Saxifragaceae</i>	Floral parts
19.	Evening primrose	<i>Oenothera biennis</i>	Dicot	<i>Onagraceae</i>	Stem, Root and leaves
20.	Blanket flower	<i>Gaillardia pulchella</i>	Dicot	<i>Asteraceae</i>	Root
21.	Savory	<i>Satureja hortensis L</i>	Dicot	<i>Lamiaceae</i>	Leaves and Stem
22.	Geranium	<i>Geranium dissectum</i>	Dicot	<i>Geraniaceae</i>	Leaves
23.	Allamanda	<i>Allamanda cathartica</i>	Dicot	<i>Apocynaceae</i>	Barks and Leaves
24.	Forget me not	<i>Myosotis arvensis</i>	Dicot	<i>Boraginaceae</i>	Whole parts

**Plate: 2**







Table 3-Lists of dominant genera of perennial dicot and monocot ornamental plants around Chapra

Sl. No	Name	Scientific Name	Dicot/ Monocot	Family	Parts Use
1.	Columbine	<i>Aquilegia canadensis</i>	Dicot	Ranunculaceae	Flower & Root
2.	Salvia	<i>Salvia splendens</i>	Dicot	Lamiaceae	Leaves
3.	Shasta Daisy	<i>Leucanthemum superbum</i>	Dicot	Asteraceae	Leaves
4.	Black-eyed susan	<i>Ruudbeckia hirta</i>	Dicot	Asteraceae	Root, Leaves, Flower
5.	Coneflower	<i>Echinacea purpurea</i>	Dicot	Asteraceae	Root, Leaves
6.	Iris	<i>Iris sibirica</i>	Monocot	Iridaceae	Root
7.	Astilbe	<i>Astilbe arendsii</i>	Dicot	Saxifragaceae	Rhizome
8.	Daylily	<i>Hemerocallis lilioaphodelus</i>	Monocot	Asphodelaceae	Root
9.	Sedum	<i>Sedum lanceolatum</i>	Dicot	Crassulaceae	Leaves
10.	Baptisia	<i>Baptisia australis</i>	Dicot	Fabaceae	Root
11.	Levender	<i>Levandula latifolia</i>	Dicot	Lamiaceae	Flower



**Continued.....**

12.	Hellebore	<i>Helleborus niger</i>	Dicot	Ranunculaceae	Root
13.	Astrantia	<i>Astrantia major</i>	Dicot	Apiaceae	Root
14.	Asters	<i>Aster amellus</i>	Dicot	Asteraceae	Flower
15.	Chrysanthemum	<i>Chrysanthemum indicum</i>	Dicot	Asteraceae	Flower
16.	Dianthus	<i>Dianthus caryophyllus</i>	Dicot	Caryophyllaceae	Leaves
17.	Rose	<i>Rosa hybrid</i>	Dicot	Rosaceae	Flower
18.	Hibiscus	<i>Hibiscus rosa sinensis</i>	Dicot	Malvaceae	Flower
19.	Gandhraj	<i>Gardenia Jasminoides</i>	Dicot	Rubiaceae	Flower
20.	Maximillian sunflower	<i>Helianthus maximiliani</i>	Dicot	Asteraceae	Root, Leaves
21.	Stonecrop	<i>Hylotelephium spectabile</i>	Dicot	Crassulaceae	Leaves
22.	Swamp rose mallow	<i>Hibiscus moscheutos</i>	Dicot	Malvaceae	Root, Leaves
23.	Thrift	<i>Armeria maritime</i>	Dicot	Plumbaginaceae	Flower
24.	Tickseed	<i>Coreopsis gigantea</i>	Dicot	Asteraceae	Whole plants
25.	Heuchera	<i>Heuchera sanguinea</i>	Dicot	Saxifragaceae	Root
26.	Yarrow	<i>Achillea millefolium L.</i>	Dicot	Asteraceae	Leaves
27.	Parijat	<i>Nyctanthes arbor-tristis</i>	Dicot	Oleaceae	Leaves
28.	Amaranthus	<i>Amaranthus caudatus</i>	Dicot	Amaranthaceae	Seed and Leaf

**Plate 3. Photograph of perreneial ornamental plants documented around Chapra, Bihar**





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## CONCLUSION

Finally, it may be concluded that such study of exploration of local diversity of ornamental plants will support conservation and protection as well as large scale production of dominant flora for generation of income to poor family of the society. Study further suggests that least/rare abundant

ornamental plants should be conserved by protecting them in their natural environment. Also, future concerted efforts directed towards study of growth condition for plantation of rare ornamental plants is required for their conservation for future generation as well as for preservation of gene pool for their exploitation at industrial scale.

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