Assessment of Nursery Administration and Identification of Ornamental Plant Species: A Case Study of Tehsil Pattoki (Pakistan)

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Abstract

Regarding the spread of plants and how people might use urban biodiversity, nursery management is essential for supplying resources for healthy plants. The current survey was conducted at Madina Nurseries in Pattoki, Punjab province, Pakistan. The current state of affairs, varied management techniques used by gardeners to run their nurseries, and the spread of different types of decorative plants served as the foundation for this survey. The main goals of this study were to enhance the present condition of nurseries and offer recommendations on the issues highlighted. Several characteristics include plant identification, nursery size, soil type, irrigation system, weeding, fertilizer usage, and propagation technique, respectively. The right fertilizer has to be utilized at the right time for plant growth and nurseries to flourish. It was acknowledged that the unidentified diseases and production of high-quality plants are associated with germplasm unit facilities.

Keywords: Nursery administration, Ornamental plants, Field survey**.**

Introduction

Farmers implemented a sustainable agricultural practice by incorporating crop rotation, ensuring soil fertility, and minimizing pest pressures. In the nursery, diverse plant species were carefully cultivated systematically, promoting healthier growth and resilience in the overall ecosystem (Zaheer et al., 2023). The production and sale of seedlings, saplings, and other planting materials for use in gardens and orchids occurs in nurseries. For a fruit crop to be prosperous and profitable, True kind, functioning correctly, and excellent planting supplies must be available. Planning is necessary before opening a nursery. Since first mistakes are difficult to remedy and could reduce

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the return on investment, careful planning and skill are needed. Thus, when establishing nurseries, one must carefully consider every area (Singh, 2015).

The young seedling needs proper care and protection throughout the early stages of germination. Compared to caring for larger nurseries and large areas with tiny seedlings, it is more convenient and straightforward to care for tiny area seedlings (Rahim et al., 2008). The most common method of plant reproduction is micropropagation, which is exceptional management, especially when transferring them into the fields with care. Experienced and skilled farmers are the primary workers to increase the production of breeding in plants (Sanaullah et al., 2020).

Regarding size, nurseries can be split into two types. To meet the demands of society, planting supplies are solely cultivated in home nurseries. The first goal is to increase the availability of high-quality materials as we know the region is small. In these types of greenhouses, pricy nursing techniques are used. Large-scale nurseries avoid expensive procedures without sacrificing the quality of their goods since they primarily focus on the financial return on their investment. The two categories of these nurseries are those in urban and rural regions (Saleem et al., 2007). Trace elements play a crucial role in plants as essential micronutrients required for various physiological processes. These elements, such as iron, zinc, copper, and manganese, are vital for enzyme activation and catalysis within plant cells. Their presence in minute quantities influences plant growth, development, and productivity. Proper management of trace elements is necessary for optimizing plant health and ensuring robust agricultural yields (Zaib et al., 2023a). Micronutrient fertilizers are crucial in providing essential trace elements to nursery plants, promoting their optimal growth and development. These specialized fertilizers address nutrient deficiencies that may hinder the plants' health. In a nursery setting, precisely applying micronutrient fertilizers ensures that young plants receive the necessary elements for robust root systems, foliage, and flowering. Incorporating these fertilizers into nursery practices produces healthy and resilient plants (Zaib et al., 2023b).

A community with a high road or a railroad station is where rural nurseries are located. As land and labor costs are lower in rural areas, nurseries there may generally be more significant. Additionally, the products are offered for less money. Urban greenhouses, on the other hand, are situated within or adjacent to a city. The size of these nurseries is often minimal because the land is costly and complex to come by. The labor, transportation, and other expenses are likewise relatively expensive, but the higher product prices and sales volume offset them. They occasionally serve as middlemen, buying planting supplies from small nurseries and selling them to customers (Saleem et al., 2007).

It is not easy to start a worktable nursery, landscaping business, or garden center takes possible. To achieve the organization's objective, a significant financial investment in land and buildings is necessary, as is expertise in the rules and regulations governing all tiers and branches of government. Therefore, all elements should be considered and assessed before choosing the venues. Increasing global demand for horticultural products has led to substantial efficiency gains in producing fruits, vegetables, and ornamental plants (Dorais & Cull, 2017). In many contexts, such intensification has relied on protected cultivation, fertilization, irrigation, and agrochemical use (Ingrao et al., 2015). These trends and rising annual temperatures have led to considerable increases in the ecological footprint of horticultural production (Cerutti et al., 2010). Only some modern industrial horticultural enterprises can be considered environmentally, socially, or economically sustainable, and it is often difficult for growers to adjust, given the economic pressures exerted by an increasingly competitive marketplace for horticultural products (De Silva, 2016). Experts in landholdings, soil science, horticulture, pathology, horticulture water resource

entomology, and allied subjects should be consulted for advice. The soil conservation service, local agricultural agents, and extension professionals based at land grant institutes can help significantly. Additionally, having experience in the field before starting a nursery firm is advantageous. (Cattivello & Danielis, 2008). The lack of spatial isolation in the nursery for horticultural and ornamental crops leads to an increase in the number of stem vermin on saplings of fruit crops; the same picture is observed when a greenhouse is lying near forests Tehsil Pattoki, District Kasur is blessed with natural resources, but the people are not financially stable. The area is rich in medicinal plants.

Aim of the Study

- To recognize different climbers, trees, palms, grasses and shrubs
- To determine the issues with the establishment of nurseries
- To make proposals for enhancing the culture of nurseries in the research region.

Previous Research

Climate change profoundly affects crops and plants, altering temperature patterns, precipitation levels, and the frequency of extreme weather events. These changes can disrupt traditional growing seasons, impacting crop yields and leading to shifts in plant distribution. Moreover, the increased occurrence of pests and diseases, exacerbated by climate change, poses additional challenges to the resilience and productivity of agricultural systems (Zaib et al., 2023c). The development and administration of nurseries span a wide range of farming disciplines. Numerous academics have focused on these components and factors to study nursery improvement thoroughly. A review of some earlier research is cited here. (Tolley, 2012) worked on improving citrus tree nurseries and making observations of citrus propagation in South Africa. The study concluded by making recommendations for advancing nursery automation in South Africa (Kuden & Kaska, 2010) Examined diverse methods for blossoming plants grown in subtropical nurseries. Stone fruits, pears, and apples were used in the research, which lasted two years. Chip budding consistently produced superior outcomes to T-budding. Similarly, Takahashi and Hagiwara (2008) presented administration strategies for entrepreneur-style greenhouse floriculture farming and reviewed the business people of Gunma's managerial capabilities. They concluded that the manager should deal with issues while hiring the new staff overseeing a nursery's daily cultural management. It was determined that the manager's managerial skills directly impacted the management and business of nurseries (Rahim et al., 2008) To control and eradicate weed species like *Sorghum helepense L, Cynodon dactylon L, Convovulus arvensis L, Medicago denticulate L,* and *Anagallis arvensis L* in various established nurseries. Researchers investigated how some herbicides, such as Tribunal and Bladex, performed both on their own and in conjunction with propenamide Cattivello and Danielis (2008) examined floriculture in the Friuli-Venezia Giulia Region. Klimenko et al. (2008) described a potential peach stock for use in southern Ukraine's nurseries, which would help the area's economy. Davidson et al. (2007) explored New Jersey, USA, researching nursery management, administration, and culture. Saleem et al. (2007) portrayed the nursery industry's prominence in Pakistan's Hazara district. Mcmahon (2013) experimented with the multiplication of Prunus angustifolia, performing fieldwork and greenhouse work. T-budding and cleft grafting were tested in the field trial. In contrast, chip maturing was employed in the glasshouse test, Aitken and Arnold (2004) explored the research on four herbicides' comparative weed control on peaches in the USA. Melinik (2004) investigated how seedlings in the fruit nursery were treated with pesticides. He saw that nursery seedlings were resistant to the pesticides being used. Alan et al,

(1998) offered information on many features of nurseries that have grown in diverse Florida, USA, fields. Salvatore and Newman (2010) demonstrated the significance of timely and effective management of growing nuts, which was emphasized to benefit farmers and commercial growers. This study has revealed that the most prevalent families of weeds are Poaceae and Asteraceae. This research holds considerable importance for the advancement of the rose industry, contributing significantly to the country's economic well-being. The findings reveal that the predominant weed family is Brassicaceae, with the most prevalent weed species belonging to this particular family in Kasur (Zeeshan et al., 2023). The survey of the current study was to investigate the medicinal plants in Pattoki, Punjab, Pakistan (Zeeshan et al., 2023). If adequate preventive measures are not performed, nurseries could collapse in their most formative stages.

Material and Methods

Survey Area

The investigation's basis was an inspection of a better understanding of plant species in the ornamental nurseries of Tehsil Pattoki. Pattoki is a city in Pakistan's Punjab province's Kasur district. It is located at 31°10'0N 73°50'60E and stands around 185 meters above sea level. In Pattoki, the climate is semiarid. There is very little rain throughout the year. The average temperature in Pattoki is 24.3 °C. Rainfall averages 340 mm in this area. The type of soil and its pH influence the plants that are sown during landscaping (Art, 2007; Burrell, 2007). The primary aims were to recognize plants, grasp and document the existing status of the green corridors using multiple variables and criteria, and make significant changes.

Framework of Study

Recognition of plants: Several plant species have been identified in this variable.
Area measurement: With a measuring tape, the nursery's total area was determined.
Soil type: Soil is a component that supports human life in different ways. It helps plants and various food crops (Zaib et al., 2023d). Organic matter in soil can improve soil conditions by enhancing its structure, water retention, and nutrient availability. Additionally, it fosters a thriving microbial community, contributing to overall soil health and sustainability for planting plants (Zaib et al., 2023e). During the Survey, the best soil was employed for nursery purposes, leading to superior results.
Irrigation system: The nurseries' watering system was documented.
Weeding: The number of times per month weeding was done was also documented, along with periodic inspections of the weed infestation.
Fertilizer application: It was noted how frequently fertilizer was applied.
Propagation method: There was a widespread assumption that reproduction may be either sexual or asexual (through budding, grafting, and cutting).
Time of propagation: It was determined how long these kinds of plants take to prepare for reproduction.
Transplanting time: It was noted how long it took for the young trees to prepare to be planted in a new location.
Field situation: It was noted if the field was on a slope, in the open, or the shade.
Issues of nurseries: Throughout the Survey, different issues with nurseries were seen and noted.

Results and Analysis

Species Recognition for Ornamental Plants

During a field survey in the nurseries in the Pattoki area of Kasur, Punjab, Pakistan, we found several species. These plants are mentioned below.

Table 1: Trees found in field survey

Zizypus jajuba	Salix babylonica	Sterculiaceae	Populous ecramericana	Leguminoseae	Bignoniaceae
Terminalea arjuna	Salicaceae	Leguminosae	Salicaceae	Pithecellobium dulce	Kigelia pinnata
Combretaceae Saraca indica	Putranjiva roxburgii	Prosopis juliflora	Pongamia galabra	Leguminosae	Oleaceae
Leguminosae Sapium sebiferum	Euphorbiacea	Populus nigra	Leguminoseae	Pistacia integerrima	Ligustrum lucidum
Euphorbiacea	Pterospermum acerifolium	Salicaceae	Pithecellobium saman	Anacardiaceae	Juglandaceae
Pinus roxburgii	Coniferacea	Pinus halipensis	Pinaceaea	Parkinson aculetata	Juglans regia
Leguminosae	Mimusops elengi	Sapotaceae Millingtonia hortensis	Bignoniaceae	Melia azedarach	Bignoniaceae
Meliaceae	Mangifera indica	Anacardiaceae	Malus bacatta	Rosaceae	Jacaranda mimosifolia
Acacia arabica	Leguminosae	Acacia farnesiana	Leguminosae	Acacia modesta	Bignoniaceae
Leguminosae	Acer ablongum	Aceraceae	Aegel marmelo	Rutaceae	Hetrophragma adenophyllum
Ailanthus glandulosa	Simaroubaceae	Albizia julibrissin	Leguminosae	Albizia lebbeck	Proteaceae
Leguminosae	Alostonia scholaris	Apocynaceae	Auracaria excelsa	Coniferacea	Grevillea robusta
Azadirachta indica	Meliaceae	Bauhinia variegata	Leguminoseae	Bischofia javanica	Myrtacaeae
Euphorbiaceae	Broussonetia papyrifera	Moraceae	Butea frondosa	Leguminosae	Eucalyptus camaldulensis
Callistemon lanceolatus	Myrtacaeae	Cassia fistula	Leguminosae	Cassia multijuga	Erythrina suberosa Leguminosae
Leguminosae	Casurina equisetifolia	Casurinaceae	Cedrela toona	Meliaceae	Delonix regia Leguminosae
Dalbergia saisoo Leguminosae	Myrtacaeae				

Table 2: Shrubs found during field survey

Aclypha wilkesisan	Atriplex crassifolia	Leguminosae	Apocynaceae	Sapindaceae	Solanaceae
Euphorbiaceae	Adenium besum	Poinciana pulcherriama	Cassia gulaca	Dracaena marginita	Citrus aurantium
Adenium besum	Chenopodiaceous	Leguminosae	Leguminosae	Liliaceae	Rutaceae
Apocynaceae	Bambusa nana	Calligonum cosmosum	Cestrum diarrnum	Duranta repans	Citrus mitis
Barleriav cristata	Gramineae	Polygonaceae	Solanaceae	Verbenaceae	Rutaceae
Acanthaceae	Buddleia hybrida	Carissia grandiflora	Cestrum nocturnum	Euphorbia pulcherrina	Dodonea viscose
Euphorbiaceae	Gardenia florida	Rubiaceae	Guaiacum sanctum	Zygophyllaceae	Hamelia patens
Rubiaceae	Hibiscus mutabilis	Malvaceae	Platycladus orientials	Cupressaceae	Thevetia peruviana
Apocynaceae	Tecoma cedar	Bignoniaceae	Tamarix nilotica	Tamariaceae	Hibiscus sinenses
Malvaceae	Ixora coccinea	Rubiaceae	Jasminum grandiflorum	Oleaceae	Jasminum sambac
Oleaceae	Jatropha gossypifolia	Kadiya calycina	Malvaceae	Murayya exotica	Rutaceae
Myrtus communis	Myrtacaeae	Nerium odorum	Apocynaceae		

Table 3: Palms found during field survey

Borassus flabellifera	Livistone chinensis	Palmae Phoenix dactylifera	Palmae Cocos nucifera	Palmae Washingtonia robusta
Cycadaceae	Palmae Washingtonia filifera	Palmae Phoenix canariansis	Mascarena regaughanii Palmae	Palmae Cycas revolute
Palmae Roystonea regia				

Table 4: Climbers found during field survey

Acanthaceae Tecoma grandiflora	Convovulaceae Allamanda cathartica	Apocynaceae Antigonon leptopus	Polygonaceae Aristolochia elegans	Aristolochiaceae Asparagus myrtifolius
Thunbergia grandiflora	Verbenaceae Ficus pumila Moraceae	Nyctaginaceae Clerodendron inerme	Bignoniaceae Bougainvillea alba	Liliaceae Bignonia venusta

Bignoniaceae Rosa marehallniel	Rosaceae Quisqualis indica	Combretaceae Pothos scandens	Aceraceae Passiflora edulis	Passifloraceae Porana paniculata

Table 5: Grasses found during field survey

Vince minore	Apocynaceae	Verbena tenera	Verbenaceae	Tradescantia fluminensis
Commelinaceae	Russelia juncea	Scrophulariaceae	Portulaca grandiflora	Portulaceae
Ocimum basilicum	Labiatae	Mesembryanthemum crystallinum	Aizoaceae	Cynodon dactylon
Gramineae				

Area

With the aid of a measuring tape, the nurseries' total area was determined to be around five acres. It was enough to finish the Tehsil Pattoki Cantonment area, where one Kanal area was designated for research.

Soil

Farmyard manure, silt, and clay were the main components of the nursery soil that was used for plantations. Soil should be evaluated to determine whether it is suitable for nurseries before nurseries are established. The appropriate amount of biological materials should be present. Sandy soil makes it difficult to cut slices for evergreen plants, thus it shouldn't be used.

Irrigation system

Sprinkler irrigation was used to irrigate entire nurseries. As a result, there was less weed growth and water waste. The following table displays the level of irrigation that personnel in nurseries apply to various plants.

Table 6: Intensity of irrigation for various plants in nurseries and fields

Sr. no.	Plants	Irrigation in nurseries	Irrigation in field Summer	Irrigation in field Winter
1	Kangi Palm	Regular in summer	Three times in a week	1-2 times in a month
2	Ziziphus jujuba	After one week	After one month	After 2 month
3	Ficus	2-3 times in week	Three times in week	2-4 times in month
4	Guava	Regular in summer	Three times in week	2-5 times in month
5	pomegranate	2-3 times in summer In week	four times a week	2 times in month
6	Citrus	1-2 times in summer in a week	Three to four times in week	2-3 times in month
7	Rose	Regular in summer	Three times in week	4 times in month
8	Euphorbia	Regular in summer	Three times in week	3-5 times
9	Bombax	Regular in summer	Four times in week	3 times in month

Weeding

In addition to causing several issues in fields and nurseries, weeds significantly reduce the output of Pakistan's principal crops (Hussain et al., 2007). Farmers typically use a variety of pesticides in the modern agricultural system to protect their crops from weed invasion (Sanaullah, 2020b). However, excessive weedicide usage is discouraged since it poses a number of the surroundings and wellness risks (Marwat et al., 2011). The effects of weed infestation were periodically evaluated, and invasive weeds were discovered.

Table 7: Weeding time for different plants in nurseries

Sr. no.	Plants	Weeding in nurseries	Weeding in the field
1	Arjun tree	2-3 times in month	After 3 month
2	Ashok tree	2 times in month	After 2 month
3	Chinese tallow tree	2 times in month	After 3 month
4	Black poplar	1-2 time in month	After 2 month
5	Phulai	2 times in month	Two time in year
6	Ficus	2 times in month	Two time in year
7	Plum albizia	2 times in month	Twice in year
8	Auracaria	2 times in month	After 2-3 month
9	Shisham	1-2 time in month	Twice in year
10	Red Gum	1-3 times in month	After 2-3 month
11	Peepal	1-2 time in month	Twice in year
12	Silver Oak	2 time in month	After 2-3 month
13	Walnut tree	2 time in month	Twice in year
14	Money plant	1-2 time in month	After 2-3 month
15	Giant Crape Myrtle	2 time in month	After 2-3 month
16	Indian laurel plant	2 time in month	After 2-3 month
17	Council tree	2 time in month	After 2-3 month

Fertilizer Application

Fertilizers are a crucial component of raising the fertility of the growing medium, which improves crop output. (Zaib et al., 2023f). Staff members reported how much fertilizer they administered to various plants at nurseries, and the results are shown in the table below.

Table 8: Amount of fertilizers on various plants

Sr. no.	Plants	Fertilizer application in nurseries	nurseries Fertilizer application in field
1	Guava	After 3 month	Twice times in year
2	Ficus	After 2 month	Twice in year
3	Plume	After 3-4 month	Twice in year
4	Silver Oak	After 3 month	Twice in year
5	Walnut tree	After 2 month	Twice in year
6	Black poplar	After 3-4 month	Twice in year
7	Arjun tree	After 2 month	Twice in year
8	Giant Crape Myrtle	After 2-3 month	Twice in year

9	Ficus	After 2 month	Three times in year
10	Council tree	After 2 month	Twice in year
11	Apricot	After 4 month	Twice in year
12	pomegranate	After 2 month	Twice in year
13	Kangi palm	After 2-3 month	One time in year
14	euphorbia	After 2 month	3 times in year
15	Palm	After 2-3 month	Twice in year

Propagation Methods

Crops can be multiplied sexually or asexually, but in the nurseries that were investigated, asexual techniques of propagation were more common are shown below.

Table 9: Propagation techniques

Sr. no.	Plants	Propagation Techniques
1	Guava	Cutting ,grafting
2	Apricot	Cutting, grafting
3	Rose	Cutting
4	Palm	Cutting
5	Euphobia	Stem cutting
6	Ficus	Cutting
7	Citrus	Cutting
8	Duranta	Cutting
9	Bamboo	Cutting
10	Jujube	Grafting and budding

Propagation time

The length of time it took the plants in the study to become propagation-ready

Table 10: Propagation time

Sr. no.	Plants	Ready for propagation	Season/month
1	Ficus	After2.5 year	June July
2	Kangi palm	After one year	June July
3	Bamboo	After 6 month	June July
4	Guava	After 1-2 year	June July
5	Euphorbia	Plant height up to 3-4 inches	June July Feb
6	Ficus	After one year	June July
7	Shisham	After 1-2 year	June July
8	Apricot	After 2-3 year	June July
9	Jujube	After one year	June July
10	Mango	After 2-3 year	June July

Transplanting time

Transplanting time for different plants

Whenever the plants were ready to be transferred to a new location. It was pointed out and displayed below.

Table 11: Timeframe when plants are ready to transfer

Sr no	Plants	Shifted to new area Orchard/ landscaping
1	Guava	After 2-3 month
2	Apricot	After 3-4 month
3	Bottle brush	After 1-2 month
4	Mango	After 2-3 month
5	Ficus	After 1-2 month
6	Euphobia	After 1-2 month
7	Bomboo	After 1-2 month
8	Jujube	After 2 month
9	Shisham	After 2-3 month
10	Neem	After 1-2 month
11	Citrus	After 2-3 month
12	Plum	After 1-2 month
13	Pomegranate	After 1-2 month

Field situation

Table 12: Condition of several flora in the field

Sr. no.	Plants	Field situation
1	Ficus	Sunny
2	Mango	Sunny
3	Jujube	Sunny
4	Palm	Sunny and partial sunny
5	Kangi palm	Sunny
6	Neeem	Sunny
7	Pomegranate	Sunny
8	Apricot	Sunny
9	Citrus	Sunny
10	Bottle brush	Sunny

Problems on Nurseries

The fact that the soil was not level encouraged weed growth when it rained. Although they needed full sun and sunshine, some plants were maintained in shadowed areas because nurseries lacked a germplasm unit. Establishing a germ plasma unit is mainly done to provide high-quality seeds and yields, which are currently in higher demand. Superior seeds, blooming woods, and grafted woods must be delivered to authorized nurseries to protect the growth material from infectious diseases and ensure it is delivered to the grower safely. The absence of a greenhouse where plants can be cultivated in a controlled atmosphere was also highlighted. Schmutz (2018) highlighted evidence that gardeners' knowledge could help to identify potentially problematic invasive plants early in the invasion process. Even with low levels of participation, all evidence collected would be precious in official risk management procedures and supporting legal obligations on early detection, surveillance, and monitoring. At the same time, however, raising awareness of the problem by actively collaborating with gardeners could be equally crucial for preventing ornamental plant invasions in the future. Syafitri and Nasrullah (2020) studied the type of nursery

influenced by the nursery area. Sales can be successful by creating a website as a functional media that can provide information on the stock and price of plants at the nurseries in Bogor Regency.

Conclusion

Various flowers and plants were observed during the field survey of the nurseries. According to this study, It is determined that the field crew showed little to no enthusiasm, and there needed to be more preparation and management. It was noticed that when doing fieldwork at the nurseries, more advanced and advised horticultural and plant methods were not being used. It was discovered that plants that needed sunlight were stored in the shade, that plant propagation had not been moved to the designated location promptly, and that a germ plasma unit and greenhouse needed to be included. It was advised that to develop and strengthen the nurseries, the management team should support full-time office and field responsibilities and employ the most recent horticultural and agricultural methods. In order to prevent disease assault and weed infestation, it is also necessary to integrate genetically modified plants, develop appropriate mechanisms for the early detection of illnesses, and work to combat invasive weeds successfully.

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