GERMINATION AND SURVIVAL OF SEEDS OF MULTIPURPOSE TREE SPECIES UNDER NURSERIES CONDITION IN POTHWAR

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2017

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بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

In the Name of Allāh, the Most Gracious, the Most Merciful

nearly some of the internal factors which in single way or another can affect the germination of seed. The main external factors which are considered to affect germination of seed involve temperature, air, oxygen, moisture or water and at times light even though most of literature in many studies do depict that there is no effect of light on germination of seed instead most of plant life are stated to germinate successfully in the dark place related to the light place but dark place has no effect in any published scientific study as a factor of affecting germination. An additional external substance like gibberellic acid and other synthetic hormones which can affect germination considerably are also not described to be factors affecting seed germination. Many scientists also agree that dormancy period, thickness of the seed coat and seed viability may affect germination of seed and therefore, are factors for germination of seed. All plant life has definite germination requirements based on environmental cues and the ecological adaptations that trigger germination for that species (Washa *et al.,* 2015).

The initial step in the process of germination is absorption of water or imbibition. Although seeds have abundant absorbing potential due to the nature of the seed coat, the quantity of available water in the seed germination medium affects the uptake of water. A sufficient, regular amount of water is vital to make sure of germination process. Once germination process has started, a dry period will cause the loss of the embryo (Bewley and Black, 1994).

Respiration takes place in all of the viable seed. The respiration in dormant seed is low, but less oxygen is necessary. During germination process, rate of respiration increases. Thus, the medium in which the seeds are to be found would be well-aerated and loose. If the supply of oxygen during germination process is reduced or limited, germination can be inhibited or severely retarded (Vozzo *et al.,* 2002).

Temperature effects rate and percentage of seed germination. Some germination patterns in reaction to temperature comprise seeds that need cool temperatures, tolerate cool temperatures, require warm temperatures, and (or) require alternating temperatures. Species demanding cool temperatures mostly germinate less than 77 °F (25 °C), which corresponds to high altitudes in tropical or subtropical areas. Species that accept cool temperatures will germinate in excess range of temperatures from 41 to 86 °F (5 to 30 °C). Various species will not germinate in excessively high temperatures. Most tropical species need warm temperatures and will simply germinate if temperatures are more than 70 °F (21 °C) (Hart-man and others 1997).

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Department of Environmental Sciences
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FINAL APPROVAL

It is certified that we have read the thesis submitted by Ms Saba Munir 220 - FBAS/MSES/F14 and it is our judgment that this project is of sufficient standard to warrant its acceptance by the International Islamic University, Islamabad for the M.S Degree in Environmental Sciences

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A thesis entitled **"Germination and survival of seeds of multipurpose tree species under nurseries condition in Pothwar"**submitted to Department of Environmental Sciences,

International Islamic University, Islamabad as a partial

Fulfillment of requirement for the award of the

Degree of MS Environmental Science

DEDICATION

I humbly thank **Allah Almighty**, the Merciful and the most Beneficent, who gave me health, thoughts and co-operative people to enable me to achieve this goal

I wish to dedicate this work to **Hazrat Muhammad (Peace Be Upon Him),** who is forever guidance and knowledge for all the mankind and his companions who laid the foundations of Modern civilization and paved the way for social, moral, political, economical, cultural and physical revolution

DECLARATION

I hereby declare that the work present in the following thesis is my own effort, except where otherwise acknowledged and that the thesis is my own composition.
No part of the thesis has been previously presented for any other degree.

Date 15-5-2017

Saba Munir

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ACKNOWLEDGEMENTS

First and foremost, I thank **ALLAH (Subhan wa Taala)** for his endowment of health, patience and knowledge to complete this work and affectionate love to **HAZRAT MUHAMMAD (P.B.U.H)** for being constant source of guidance. Special thanks to my supervisor, **Dr. Rukhsana Tariq** for her supervision and constant support. Her invaluable help of constructive comments and suggestions throughout the thesis work have contributed to the success of this research. I acknowledge to my co-supervisor, **Dr. Imtiaz Ahmad Qamar** for all his support and knowledge and who paid great attention from his precious time regarding this topic. He provided me critical and helpful consultation and valuable assistance through this research. He has always been a source of guidance for me during my research work. This thesis would not have been possible without his expert advice.

I would like to express words of special thanks to my parents and brothers whose devotion, encouragement, support and their blissful prayers enabled me to complete this uphill task and patiently assisting with words of assurances. My acknowledgements also go to all my teachers for their co-operations. I am lucky to be bestowed with prayers offered in my favor by my family. I pray to give them the best of my life. Finally, I thanks to friends who have helped me directly or indirectly in the successful completion of my thesis.

With sincere gratitude to all concerned.

Saba Munir

LIST OF ABBREVIATIONS

Acronym	**Abbreviation**
NARC	National Agricultural Research Centre
ICRAF	International Center for Research in Agro forestry
MGT	Mean Germination Time
GP	Germination Percentage
GI	Germination Index
GNP	Gross National Product
SAV	Submerged Aquatic Vegetation
ANOVA	Analysis of Variance
dB	Decibel
M	Meter
GA_3	Gibberellic Acid
H_2SO_4	Sulphuric Acid
H_2O_2	Hydrogen per Oxide
KNO_3	Potassium Nitro Oxide
LSD	Least Significant Difference
SEM	Scanning Electron Microscopy
FE	Finite Element
GCA	General Combining Ability
SCA	Specific Combining Ability
KPK	Khyber Pakhtunkhaw

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ABSTRACT

The study was conducted at National Agricultural Research Centre (NARC), Islamabad. The present study was undertaken to find out germination percentage of multipurpose tree species which are of fodder, fuel wood and of timber importance under different growth media and nursery condition. Maximum germination percentage in farmyard manure was found. *Bauhinia variegata* which was statistically higher (23.00%) from all other species except *Parkinsonia aculeata. Parkinsonia aculeata* had higher seed germination of (22.33%) followed by *Leucacena leucocephala* (20.67%), *Albizzia lebbek* (14.00%), *Acacia modesta* (11.33%), *Acacia nilotica* (11.00%), *Cassia fistula* (9.67%), *Pongamia glabra* (9.00%), *Acacia albida* (7.33%), and *Acacia tortilis* (7.00%). In compost, *Bauhinia variegata* had highest germination (23.33%) followed by *Leucacena leucocephala* (22.00%), *Parkinsonia aculeata* (19.67%), *Acacia modesta* (11.00%), *Albizzia lebbek* (10.00%), *Cassia fistula* (9.67%), *Acacia nilotica* (9.00%), *Acacia albida* (7.00%), *Pongamia glabra* (6.00), *Acaciatortilis* (4.66). In soil media maximum seed germination was observed *Bauhinia variegata* (14.00%) which had higher germination followed by *Parkinsonia aculeata* (10.00%), *Leucacena leucocephala* (9.33%), *Acacia modesta* (8.22%), *Acacia albida* (6.33%), *Acacia nilotica* (5.6%), *Acacia tortilis* (5.6%), *Cassia fistula* (5.33%), *Albizzia lebbek* (2.00%), and least in *Pongamia glabra* (0.67%). It is concluded from the study that maximum germination percentage in farmyard manure was found. Highest growth of roots and shoots was observed in compost medium. Soil medium had the lowest seed germination and growth as it had the lowest nutrients so there is need to increase forest cover of the country on farm land. The fertility of the soil is decreasing due to intensive cropping so there is need to increase to grow leguminous trees there is need to improve the germination of seeds so that more and more useful trees are grown on the farms in agro forestry practices.

life and not just restricted to some species. Although they play such a vast role in the environments, we are still letting them to perish. http://wwf.org.pk/blog/2015/08/13/the-importance-of-forestry.

In Pakistan, under natural forests and plant cover most important forest types comprising coastal mangroves, sub-tropical scrub forestry, riverine forestry, dry temperate conifer forestry, moist temperate conifer forests and irrigated plantations comprising of linear cultivated area. Pakistan is home-grown to approximately of the world's best and unique forests comprising deodar, juniper and chilghoza forestry (Government of Pakistan, 2005).

The climatic, water and soil situations in most of the areas of the country are not contributing to aforestation on enormous scales. Prevailing forest capitals are insufficient for meeting national loads of wood for the increasing inhabitants of the nation. 3 times real demand of wood is greater than the yearly increase of wooded area or potential viable supply. Also, the forest holders and native societies rely on woodlands as sole source of income. Resultantly, forestry in entire provinces mostly in Gilgit Baltistan and Khyber Pakhtunkhwa are under severe pressure. Rate of deforestation at the nationwide is assessed at 27,000 hectares annually which generally occurs in community and privates possessed natural forests. Harmful impacts of deforestation in watershed areas are on the yield and excellence of water at outlets besides triggering land degradation and damage to biodiversity. Extreme industrial manipulations, clearance of land for farming purposes and procurement of firewood and medicinal plants, the altering environmental conditions due to industrial development, urbanization, and increase in population and an increase in agricultural land have thus increased the risk to the natural environment and the biodiversity of Pakistan has led to deforestation during latest decades. Forests are a main source of biodiversity, and controlling the adverse impacts of climate change and support to protect their living and reduce flood destruction. Deforestation rate of Pakistan is high. According to the Federal Bureau of Statistics, there was a 3% decline in forest range among 2000 and 2005. The recommended grounds reasons are urbanization, farming methods, over grazing, global warming, and the usage of wood as a key energy source in rural areas (Government of Pakistan., 2005).

Deforestation has led to a number of adverse natural and environmental significances, apart from the clear ecological and economic ones due to the damage of biomass. More or less of these is top-soil erosion, reducing of the water table, lack of rainfall, adverse climatic effects, formation of wasteland. Deforestation has also caused extinction and migration of certain animal species (at least locally). At an alarming rate, the reduction of forestry biomass is a great basis in both developed and developing countries. In developing countries, key causes of decrease is due to human behavior, industrial development, rise of agricultural land, clearing of land for settlement, wood cutting for fuel, forage and paper created industries, etc. All of these lead to the biomass degradation, also due to direct harvesting or by a letdown of carrying capacity by contamination (Munn and Fedorov., 1986).

Germination of a seed is a critical phase in the life series of trees mainly in arid and semi-arid land, which lay open to several harmful conditions, besides this has critical impact on the following stand of plants life. Natural propagation success depends essentially on the comeback of the seeds to the interfering of many external factors. Hence, germination of seed success may reveal about population size, abundance and distribution (Flores and Briones *et al.,* 2001; Ramírez padilla and Valverde *et al.,* 2005; Rojas-Aréchiga *et al.,* 1998). Definitely, the environmental circumstances of the region of species existence are important to determine the seed features and its germination reactions. Essentially, the temperature effect the seed germination process and supports or inhibits the process of germination (Cota Sánchez and Abreu *et al.,* 2007; Flores *et al.,* 2006; Ramírez-padilla and Valverde *et al.,* 2005; Simão *et al.,* 2007; Valverde *et al.,* 2004), soil or substrate variety, water availability and the degree of gas exchange. All these factors affect the seed germination. Understanding germination is so significant ecological relevance (Bewley and Black *et al.,* 1994; Fenner and Thompson *et al.,* 2005).

Many nutritive elements such as minerals, vitamin concentrations and bioavailability of trace elements are stated to improve in germination (El-Adawy *et al.,* 2002; Khattak *et al.,* 2007). According to Rojas-Arechiga and Vazquez Yanes (2000), amongst the important environmental factors affecting the sprouting of cactus are light, temperature and water availability. According to Rojas-Arechiga *et al.*, (1997), environmental conditions could positively or negatively affect reproduction, production, and restoration of submerged aquatic vegetation (SAV). As SAV populations decay, it is significant to main effects of salinity, temperature and to a lesser degree oxygen, light and sediment composition, has been well documented for terrestrial plants which understand the likely impacts of the environment on the natural developments of reproduction (Baskin *et al.,* 1998).

Seed germination is known to be affected by both internal and external factors of the environment. Hormones affect and various growing phases of the seed and enzymes are

nearly some of the internal factors which in single way or another can affect the germination of seed. The main external factors which are considered to affect germination of seed involve temperature, air, oxygen, moisture or water and at times light even though most of literature in many studies do depict that there is no effect of light on germination of seed instead most of plant life are stated to germinate successfully in the dark place related to the light place but dark place has no effect in any published scientific study as a factor of affecting germination. An additional external substance like gibberellic acid and other synthetic hormones which can affect germination considerably are also not described to be factors affecting seed germination. Many scientists also agree that dormancy period, thickness of the seed coat and seed viability may affect germination of seed and therefore, are factors for germination of seed. All plant life has definite germination requirements based on environmental cues and the ecological adaptations that trigger germination for that species (Washa *et al.,* 2015).

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Seed germination is influenced by quality and duration of light. In nature, seeds of tropical pioneer species need high light range related with a canopy gap for germination and establishment, while shade tolerant species usually can germinate in deep shade or in very poor light. Tropical native species of small-seeded trees fall into this group. So these seeds must to be sown on the medium surface so they are visible to light throughout germination. Species needing darkness to germinate are those that germinate readily in the deep shade of a closed forest canopy. For maximum germination tropical trees and vegetation with medium to bigger sized seeds often need darkness, but herbaceous plants and shade tolerant vines may have smaller seeds (Drake *et al.*, 1993).

Sometimes changing the way of growth is not enough to keep vegetation from severe conditions. The capability to stop growth and drive into a dormant stage delivers a survival advantage. Seed dormancy is great example, but there are in-between approaches to waiting out the bad times as well. In the life of plant environmental signals both initiate and end dormant phases. During dry climates, seed dormancy takes place predominantly in the dry period, often the summer. Precipitations trigger germination when circumstances for survival are most favorable. In regions of seasonal drought annual plant life occur frequently. Seeds are best for tolerating annual plant life to bypass the dry period, when there is inadequate water for growth. When it rains, they can germinate and the plants can grow quickly, having adapted to the somewhat short times when water is accessible (Radosevich *et al.*, 1996).

A nursery is a managed place, designed to produce seedlings grown in favorable environments till they are prepared for planting. All nurseries mostly purpose is to produce adequate amounts of great quality seedlings to fulfill the requirements of consumers. Seedlings and grafts are produced in nursery from where the ornamental gardens, fruit orchards, and forest can be established with least care, budget and maintenance. The nursery planting materials are accessible at the start of the planting period. There is a widespread scope for forest fruit ornamental, orchards, vegetable, and landscape botanical gardens at community places, highways and co-operative housing societies. It guarantees the production of genetically better-quality planting material. It helps in employment prospects for technical, mechanical, skilled, semi-skilled, unskillful labor. They are main source of supplying the sapling for meeting the paper, fruit, pulp, wood and, fuel, timber and other loads of the industries. Basic human needs are contributed historically by forest plantations. Most important examples are their uses for domestic goods such as poles, fruit, etc.; in industrial

2 Literature Review

According to UBET (Unified Energy Terminology) wood fuels comprise of all forms of bio fuels resulting directly and indirectly from plants and vegetation grown in forests and non-forest land (FAO, 2004). Wood fuels can be divided into four major forms: charcoal, black liquor, fuel wood and other. Fuel wood is not thus identical with wood fuel as a lot considered (Johnsen *et al.,* 1999) Wood fuel create a most important source of energy in most nations, both developed and developing its influence is likely to grow in the future as a consequence of the use of stricter environmental rules and the usage of new competitive sources of locally existing energy. In some cases techniques used to extract wood energy are not sustainable, leading to land degradation. Wood energy production has consequently has direct consequences on the environment. Socioeconomic, cultural, institutional and legal aspects also affect production and availability of wood energy.

Kabir and Iqbal (2011) studied the properties of different industrialized soils on sprout development of *Cassia fistula* L. as linked to regulate in ordinary field settings. Growth variables i.e. seedling length, plant cover, total of leaves, leaf part, seedling, total plant dry and fresh weight etc. were recorded. For Shafi Tannery soil sprout length, plant cover, total of leaves, leaf part and seedling fresh weight were considerably ($p<0.05$) high as compared to other contaminated soils of industrial location. Indus battery and Dalda Ltd. Soils indicated considerably ($p<0.05$) decrease in growth of *C. fistula* as related to seedlings from further industrial soil as well as Karachi University Campus. The sprouts of *C. fistula* revealed tolerance to Shafi tannery and Pakistan metal industrial soils as linked to seedlings grown in and Indus Battery soils and Dalda Ltd.

Fredrick *et al* 2016 conducted experiment in nursery on the germination of *Faidherbia albida* at ICRAF to conclude the properties of seed pretreatment procedures, Nairobi from six attributions comprising of Awassa, Taveta, Lake Koka, Maseno, Chinzombo and Wagingombe. Five pretreatment methods were exposed to seeds specifically nicking, soaking in acid, hot water, cold water and control. The data was subjected to ANOVA and Germination Percentages (GP) Mean Germination Time (MGT) and Germination Index (GI) were calculated. The study showed major (p B 0.05) Variances in seed treatments between attributions in all calculated factors. Maximum germination between pretreatments in Awassa (99 %) and Wagingombe (80 %) was viewed in nicked seeds, Chinzombo (81 %) in nicked and acid treated seeds, Lake Koka (90 %) in acid treated seeds and Taveta (28 %) and Maseno (64 %) in cold water treated seeds. Nicking provided the maximum cumulative GP (69.67) whereas in hot water treated seeds lowest GP was observed (23.17). Acid treatment showed lowest MGT (8.85 days) and maximum GI (2.29) whereas maximum MGT (24.35 days) and lowest GI (0.31) were observed in control and hot water treatment respectively. While acid treatment provided a maximum GP and lowest MGT and GI, for 24 h nicking and soaking in cold water is being suggested as inexpensive and less harmful pretreatment procedures to increase germination in *F. albida* subsequently sulphuric acid is expensive and needs appropriate management techniques. Significant correlation among geo-climatic data and germination parameters of seeds subjected to different pretreatments shows that attributions are as significant as pretreatments in germination of the species.

Gill and Shankiti (2015) studied the composting of waste plant materials and its usage in agriculture and landscape sites is an environmental friendly way of reducing waste material and conserving the environment. In this view initiative taken at the Dubai based International Center for Bio saline Agriculture to compost the plants based waste material (lawn cuttings-grass) to compost. The material was inoculated with a group of microbe's primary to form constant and matured compost with more organic matter (38%). Fulvic acid was extracted from the compost to conduct the seed germination tests. Experiment was led in a pot over a period of 30 days in the green house to study the influence of Fulvic acid on the seed germination, and plant development of *Prosopis cineraria* (L.) Druce (Ghaff) and *Acacia tortilis* (Forssk) Hayne. Seeds of both trees were treated with Fulvic acid at 0.5% and 1% and water treatment was used as control. Usually seed germination and biomass were improved at both rates of Fulvic Acid, though, a definite increase was found in seed germination when fulvic acid was used at 1.0% (*Prosopis cineraria* 27%; *Acacia tortilis* 20% increase over control). Also biomass (shoot and root) of *A. tortilis* and P. cineraria was rise to 34% and 94% respectively.

Loth *et al.,* 2005 studied the germination of *Acacia tortilis* in field and laboratory experiments. *Acacia tortilis* seeds intensely depend on micro-site conditions. Seeds to be found on topmost of the soil infrequently germinated, whereas seeds enclosed with elephant dung or had a germination success among 23– 43% buried below the soil surface. On bare soil, 39% of both the dung-covered and buried seeds germinated, in perennial grass swards 24–43%, and below tree canopies 10– 24% respectively. In laboratory experiments, seed water absorption correlated positively with temperature up to 41^0 C, although succeeding germination was optimum at low (21–23 ^{0}C) temperatures. Seeds that had absorbed water lost their viability when kept above 35.5 ∘C. The deficiency of light did not considerably influence germination success. *Acacia tortilis* does not dynamically disperse its seeds, but redevelopment external tree canopies were significant. The redevelopment potential thus intensely depends on the physiognomy of the vegetation.

Rahman and Iqbal (2007) studied the properties of soils gathered from Khan Towel, Tanveer Garment, One Tech Rubber and One Tech Ply Board factories in the area of Korangi and Landhi industrial areas, and observed the growth of *Leucaena leucocephala* in a greenhouse in natural environmental conditions. Plants of *L. leucocephala* which were grown-up in soils of Tanveer Garment factory revealed decreases in various of the growth variables like root length, shoot length, seedling length, plant cover, number of leaflets, leaf area and dry weights of root, shoot and leaf and total plant dry weight (which included root, shoot and leaf dry weights) as associated to plants grown-up in soil of a control area (Karachi University Campus soil). Khan Towel and One Tech Rubber factory soils caused reduction in the growth parameters such as number of leaflets and dry weights of root, shoot and leaf and total plant dry weight of *L. leucocephala* as associated to plants in control area soil whereas root/shoot ratio was reduced in plants which were grown in One Tech Ply Board factory soil over the control soil. Growth of *L. leucocephala* was generally improved in soil of a control area while associated to soil of Tanveer Garment factory. The sum of total soluble salts and available sulfate in all of the industrial areas soils were higher relative to a control area soil of Karachi University Campus. Total soluble salts and copper were found in highest extent in the soil of Khan Towel factory as compared to a control area soil. Tanveer Garment Factory soil had low organic matter and high quantity of zinc than control soil. In the case of One Tech Rubber Factory, the quantity of coarse sand and concentration of calcium carbonate was generally greater than before and over the control soil whereas level of chromium was higher in One Tech Rubber Factory soil than a control soil. Soil of One Tech Ply Board factory had highest magnitude of available sulfate relative to the control soil. The research demonstrated that the growth of L. *leucocephala* was significantly reduced in plants which were grown in soil of Tanveer Garment factory than a control area soil of Karachi University Campus. Khan Towel and One Tech Rubber factory soils showed decreases in various growth variables of *L. leucocephala.* This revealed that the soil of industrial areas of Korangi and Landhi, particularly of Tanveer Garment Factory followed by Khan Towel Factory and One Tech Rubber Factory is polluted by the current effluence in the area.

Al Azazi *et al*2013 studied the ornamental responses of *Acacia tortilis* subspecies tortilis seeds to about chemical and physical treatments, such as Mechanical Scarification, Chemical Scarification, GA_3 (Gibberellic Acid), dry heat treatment, potassium nitrate (KNO_3) in solutions of water, sulphuric acid (H_2SO_4), Hydrogen peroxide (H_2O_2), tap water and boiling water to increase germination percentage. The obtained results revealed significant differences in the germination percentage of *Acacia tortilis* seeds treated by different dormancy treatments, the highest germination percentage was 76 % achieved with boiling water treatment, treated seeds with 98% concentrated sulphuric acid for periods 10, 20, 25, 30 Min. enhanced germination Percentage to 33%, 67%, 70%, 75% respectively, standard germination percentage and germination rate. The lowest germination percentage with untreated seeds was observed 25%.

Espahbodi *et al.,* 2006 studied the tree age properties on seed germination in a mountainous nursery, seeds were collected from 40 individual trees on nearly 40000 hectares of Iranian residual forests (1700-2200 m altitude) and planted during 2 successive years in a nursery, located 1500 m above sea level. Percentage of germinated seeds was recorded for the two planting dates. Age effects (DBH) on seed germination rate were significant ($p<0.05$). The best germination rate was related to trees with DBH of 25 to 35 cm both in the first and second year. Besides, differences between total germination rate during the first and second years were significant ($p<0.01$). Seed germination measured in the first year increased by 9.22% compared with the second year. The decrease in seed germination rate recorded in older individuals was stronger than in the younger ones.

Ahmed *et al.,* 2015 conducted a research on seed germination, viability, and dormancy of important multi-purpose legume trees which included *Phulai (Acacia modesta Linn.), Kala Shirin (Albizzia lebbek Linn.), Amaltas (Cassia fistula Linn.), Shisham (Dalbergia sissoo Linn.) and Iple Iple (Leucaena leucocephala Lam.).* In laboratory conditions different pretreatments, i.e., soaking in normal tap water for 24 h, hot water soaking for 2 to 6 h, nicking and acid scarification for 5, 10, 15, 30 minutes were applied for breaking seed coat dormancy. The results showed that nicking and acid scarification significantly ($P<0.05$) improved germination percentage of *Acacia modesta* (92%), *Cassia fistula* (100%), and *Leucaena leucocephala* (98%), whereas soaking of *Albizzia lebbek* seeds in hot water for three h gave 80% germination. *Dalbergia sissoo* seeds gave 95% germination under control conditions. In view of these results, nicking for *Acacia modesta*; acid scarification for 15 minutes for *Albizia lebbeck*; nicking and acid scarification for 30 minutes for *Cassia fistula*; and nicking for *Leucaena leucocephala* seeds are recommended for enhancing percentage as well as speed of the germination. In case of *Dalbergia sissoo,* no treatment was recommended for attaining good germination.

Muhammad and Abu Bakar (2013) studied the effects of germination by sulphuric acid and hot water treatments of Tamarind *(Tamarindusindica).* In ordinary environmental condition for germination in poly pots seeds were sown. *T. indica* (one seed per pot) thirty (30) seeds with ten replicates for each were used. With fifty (50%) percent sulphuric acid concentration highest germination percentage was noted in seeds treated sixty (60) minutes soaking period. It is observed that the germination is to be improved by the influence of sulphuric acid on disturbing the seed coats of Tamarind (Jabbe), followed by hot water.

Khan *et al.*, 2010 studied the disturbing tree species of Islamabad in 1982 CDA tree plantaton has extended the 11 million spot. Earlier the invasion of fresh species in capital area was not observed some of these non-native species occurred the injurious effects then the experts took it seriously and to find out the injurious effects great research work was approved out for these species. This study deals with exotic species of Islamabad, which produced severe problems in many ways, though some plant species which are attacked from side to side seed import or by air, water, animals seed disposal from the neighboring areas or new cities and countries. Most aggressive weeds of the area are 9 species viz., *Broussonetiapapyrifera, Partheniumhysterophorus, Cannabis sativa, Lantana camara, Xanthium strumarium, Alternantherapungens, Trianthemaportulacastrum, Pistiastratiotes*and*Phragmitesaustralison*which work done. For instance, alien invasive plant species which cause great loss to farming communities and reduce land worth but were identified as a basis of allergy as well. A study revealed the list of invasive plant species, their effect on environment and likely arrangement.

Rajendran and Mohan (2015) studied the different forest nurseries of Tamil Nadu State Government located in Madurai district. The overall of 70 species, fitting to 55 genera of 29 families have been stated. The utmost significant family was Caesalpiniaceae with 10 species fitting to 7 genuses, followed by Apocyanaceae and Bignowdaszcniaceae with 4 genera and 4 species and Mimosaceae with 6 species fitting to 3 genera and Fabaceae with 5 species belonging to 3 genuses. The maximum numbers of species were noted in Caesalpiniaceae, followed by Mimosaceae, Fabaceae, Apocyanaceae and Bignoniaceae families. Between the 29 families, single family was in monocotyledon group and 28 families were going to dicotyledons. Entirely the species are commercially essential and multipurpose usages such as medicinal, food, fodder, timber, ornamental and avenue trees.

Eliud*et al.,* 2010 conducted research to define the effects of relative humidity and temperature under stockists store conditions on the sustainability of bean seeds stored. Mwitemania- GLP 92 bean seeds were stored by stockists at different locations varying in relative humidity and temperature. At the Seed Science laboratory, Chepkoilel Campus the similar seeds were also stored in measured temperature of -20°C and relative humidity of 50%. Mean temperature and relative humidity of the three stockists stores in each town were recorded daily and their means calculated. The bean seeds were packed in clear polythene bags and stored by stockists in Bungoma, Nyeri, Nairobi and Mombasa. Viability and vigour tests were performed at zero days of storage and after every 30 days for 12 months of storage. Data was subjected to Analysis of Variance (ANOVA) and means separated by Least Significant Difference (LSD) at $P<0.05$. Results showed that the seeds stored under controlled conditions at Chepkoilel Campus maintained their quality for 12 months while the seeds stored by stockists in Mombasa with recorded mean maximum temperature and relative humidity of 30.8°C and 80.1 % respectively showed a rapid decrease in viability which went below the accepted levels after one month of storage. In Nyeri, Bungoma and Nairobi, seeds remained viable above the accepted levels for 6 months. At the stockists stores It was determined that longevity of seeds depends on the relative humidity and ambient temperature.

Pallavi *et al.,* 2014 he studied the *Abrus precatorius* medicinal plant and different dormancy breaking treatments were carry out on newly harvested seeds to increase germination. Treatments comprises physical and physiological methods like soaking in water (24 h), conc. H_2SO_4 (2 min), KNO_3 (2%) (24 h), GA_3 100 ppm (24 h), Kinetin 100 ppm (24 h) and mechanically damaging the seed coat. The experimental results showed that *A. precatorius* possess seed dormancy, generally due to leathery test a prominent to impermeability instead of water and oxygen thus known as hard seeds. Between treatments, damaging the seed coat (Nicking) improved germination from 32 to 84%, monitored by seeds soaked in gibberlic acid (100 pm) for 24 h (78 %). In natural surroundings, dormancy was slowly reduced and generates no dormancy behavior later seven months of harvest. For speedy viability test, seed coat need to be mechanically damaged already preconditioning of seeds for improved outcomes. Similarly, seeds soaked in Tz solution of 1.0 (%) for 6 h or 0.1% for 12 h supports for vibrant differentiating of viable and non-viable seeds in abrus.

Gere *et al.,* 2015 studied the efficiency of changed pre-treatment methods for the breakings of seed dormancy in Berchemia discolour Hemsley seeds was assessed. Randomly viable seeds were sampled and exposed to different pre-treatment methods which consist of filing, soaking in 98% concentrated sulphuric acid, pre-chilling and boiling. To each treatment, three replications and ten seeds were done for each treatment. The analysis shown that filing improves seed germination and seed dormancy is possibly due to the rigid seed coat which has to be damaged or destroyed smoothly to avoid embryo damage therefore easing germination. While, filing affected seeds to germinate, the mean germination rate of 13.3% that was attained is too low to make this research conclusive. More studies similar to this are suggested to expand the germination rate to greater than 30%.

Algunaid *et al.,* 2013conducted research to determine viable and applied seed dormancy breaking method as reflected uniform germination. In Sudan, seeds chosen from three different localities (Sinnar, Southern Kordofan and Southern Darfur States) and germination was observed by three intermission of water soaking (12hr, 18hrs and 24hrs) and three different concentrations of Gibberellic acid (0.01con, 0.001con, and 0.0001con) in controlled environmental conditions in germination chamber. Result shown significance changes among the three localities on seed aspects, Mahogany seed showed large and small sizes which are extremely dormant In assumption soaking in H_2O for 18 hrs and GA3(0.01 cons) for two hours are the greatest treatments to breakdown seed dormancy.

Adam Puteh *et al.*, 2011 studied the effect of seed anatomy and seed moisture content on water uptake by wild banana seeds. Matured fresh and dry, intact or scarified seeds of three wild banana ecotypes (*Musa acuminataColla) viz. Krau White, Serdang Red* and*Serdang Yellow* were imbibed for up to 96 h. At different intervals Percentage increase in seed mass was recorded. By using scanning electron microscopy (SEM) internal morphological structures of fresh and dry seeds were viewed. Seed mass increased rapidly within first hour and the rate of increase was continuously greater in dry seed than the fresh seed in all the ecotypes. The SEM observation shown that the quick increase of seed mass is likely due to the shrinking of the operculum and the neighboring tissues in the hilum area which caused in the formation and widening of a water channel in dry seed. This research shows that operculum does not impede water uptake in mature banana seed during imbibition, proposing that seed dormancy in these three ecotypes is not due to physical dormancy but possibly will be due to physiological in environment.

Nasir *et al.,* 2012 conducted research to examine *Paederusfuscipes* assemblies to cultivated soils and forest parameters of the Punjab, for the period of 2008-2009 with six different collecting methods (pitfall traps, light traps, flight intercept traps, and Berlese funnel traps, sweep net and visual observation). Pitfall trap method collected more population. Due to presence of soft bodied insects data was recorded from the maize (*Zea maize*) and berseem (*Trifolium alexandrinum*) crops. Under ordinary conditions it favored damp soil rich in organic material for egg laying and observed more activity near the ground. Extreme population was noted in March and July-August. Light had good outcome on it, so maximum activity was observed during night also. By light and soil moisture contents its activity is greatly influenced.

Khan and Zereen (2012) conducted a research on the ethnobotanical data of local community on wild trees of eight districts of Central Punjab, viz., Vehari, Pakpattan, Lahore, Faisalabad, Nankana Sahib, Sahiwal, Sialkot and Narowal. During 2008-09 Systematic field trips were prepared and information was collected by questioning local people. The plant inventory of 48 plant species belonging to 23 families was constructed, as well as their value by indigenous people of respective districts for several purposes, i.e., medicine, fodder, fuel, vegetables, fruits, timber, etc. Phenological performance of plants was seeing both from February to June or July to January but some trees (4.2 %) were create to flower all over the year.

Mandal *et al.,* 2012 studied the effects of climate change on the marginal communities and the status of silvoagriculture species in Mahottary district of Nepal. An appropriate questionnaire was used to define the influences of climate change. Bio-physical data was collected through Stratified random sampling. The consequences revealed a period in flowering and ripening times of agriculture crops. The values of Shannon Weinner and Simpson indices were 2.53 and 0.86 respectively in 2005 and 2.34 and 0.85 respectively in January, 2012 showing the impacts of climate change on forest species. Bees that make hive on *Bombax ceiba* were not found and the marginal communities were affected. Similarly, Terai indigenous communities and Dalits were found to have been affected because of insufficient fish in the paddy fields. Frogs and storks were scarcely found in the farmlands.

Extreme drought, untimely floods and mass-wasting have been damaging the wealth and health in the locality.

Yazdi *et al.,* 2013 conducted a research on germination and seedling emergence of sheep sorrel in laboratory and green house environments to study the properties of some aspects (gibberellic acid (GA_3), cyto kinin, scarification, ethanol, pH, osmotic and salt stress and planting depth).By adding GA_3 in a series of 0 to 200 ppm had prominent special effects on seed germination. As compare to wet pre-chilling, markedly increased germination of sheep sorrel seed in dry pre-chilling related with control. High levels of ethanol inhibited germination of sheep sorrel. As salt concentration increased from 0 to 160 mm it decreased germination from 87% to 39%. In an extensive range of buffered pH solutions sheep sorrel seed germinated but the maximum germination occurred above a pH range of 6 to 7. On the soil surface seedlings emergence of sheep sorrel was maximum and not any seedling emerged from a depth of 4 cm in soil.

Koger *et al.,* 2004 conducted a research in field, research laboratory, and greenhouse experiments were carried out to conclude the effect of environmental aspects on germination, emergence, seed production potential and existence of Texas weed. Normally 893 seed per plant of Texas weed was produced, and viable are 90%. 56% percent germination for seed exposed to no pre chilling to 1% for seed pre chilled for 140 d at 5 C. In prolonged pre chilling conditions seed stayed viable, by 80% of seed was viable of pre chilling after 140d. Above a range of 20 to 40 C Texas weed seed was germinated, with optimal germination (54%) arising with a shifting of 40/30 C temperature regime. Seed germination was 31 to 62% in excess of a pH range from 4 to 10. Germination of Texas weed went from 9 to 56% as osmotic potential reduced from 2 0.8 MPa to 0 (distilled water). Germination was more than 52% at a smaller amount than 40 mm NaCl concentrations and lowermost (27%) at 160 mm NaCl. soil depths as deep as 7.5 cm (7% emergence) Texas weed seedlings was emerged, but emergence was 67% for seed located at a 1-cm depth or on soil surface. In saturated or flooded environments seed did not germinate, but after flood removal seed survived flooding and germinated was (23 to 25%). Texas weeds seedlings 2.5 to 15 cm elevated and by emersion in 10cm deep flood for up to 14 d were not affected. These consequences recommended that Texas weed seed is capable of germinating and surviving in a variation of climatic and edaphic surroundings.

Khanum*et al.*, 2012 studied the predicting impacts of climate change on medicinal asclepiads of Pakistan using Maxent modeling. Maximum entropy (Maxent) modeling was used to predict the potential climatic niches of three medicinally important Asclepiad species: *Pentatropis spiralis*, *Tylophora hirsuta*, and Vince toxic *V. arnottianum*. All three species are members of the Asclepiad plant family, yet they differ in ecological requirements, biogeographic importance, and conservation value. Occurrence data were collected from herbarium specimens held in major herbaria of Pakistan and two years (2010 and 2011) of field surveys. The Maxent model performed better than random for the three species with an average test AUC value of 0.74 for P. spiralis, 0.84 for *V. arnottianum*, and 0.59 for *T. hirsuta*. Under the future climate change scenario, the Maxent model predicted habitat gains for *P. spiralis* in southern Punjab and Balochistan, and loss of habitat in south-eastern Sindh. *Vincetoxicum arnottianum* as well *as T. hirsuta* would gain habitat in upper peaks of northern parts of Pakistan. *T. hirsuta* is predicted to lose most of the habitats in northern Punjab and in parches from lower peaks of Galliat, Zhob, and Qalat etc. The predictive modeling approach presented here may be applied to other rare Asclepiad species, especially those under constant extinction threat.

Ovono *et al.*, 2009 studied the effect of storage conditions on sprouting of micro tubers of yam (*Dioscorea cayenensis–D. rotundata complex*). The control of field tuber dormancy in the yam is poorly understood. Although studies have examined single environmental factors and chemical treatments that might prolong tuber dormancy and storage, only a few were focused on further tuber sprouting. The present study concerns micro tubers obtained by in vitro culture. When micro tubers were harvested (after 9 months of culture) and directly transferred on new medium without hormones, the tubers rapidly sprouted in in vitro conditions. No dormancy was observed in this case. Harvested micro tubers were also stored dry in jars in sterile conditions during 2 to 18 weeks before in vitro sprouting. In this case, micro tubers stored during 18 weeks sprouted more rapidly than those stored 8 weeks. A constant ''dormancy-like period'' (storage duration + sprouting delay) was observed, between 20 and 28 weeks respectively for the more rapid and the slower micro tubers. The size of the tubers used for the storage had great influence on further sprouting. The larger they were, the better they sprouted. Light during storage had no effect on the sprouting delay while a temperature of 25 8C permit a quicker sprouting than 18 8C. The medium used to obtain micro tubers could also have an effect on sprouting rate. Ex vitro sprouting was not a problem. There was a delay in sprouting in contrast to in vitro conditions but the rate of 100%

was kept. This fact is very important for an agronomical application of this technique to the production of ''seeds'' directly usable in the field or after culture in the greenhouse.

Ma *et al.*, 2012 studied the fault characteristics of a single span rotor system with two discs are investigated when the rubbing between a disc and an elastic rod (a fixed limiter) occurs. First, a Finite Element (FE) model of the rotor system is developed, a point–point contact model is established to simulate the rotor–stator rubbing by simplifying the disc and the rod as two contact points, and then the two models are coupled by contact force. In addition, the augmented Lagrangian method is applied to deal with contact constraint conditions and the coulomb friction model is used to simulate rotor–stator frictional characteristics. The vibration features of the rotor system with rubbing are analyzed with respect to the effects of the gaps between the disc and the rod, the contact stiff nesses under three typical cases with different rotating speeds. The simulation results show that different rotor motions appear, such as period-one motion (P1), P2 and P3 with the increasing rotating speeds, which are in agreement with the experimental measurements. Besides, the gap between the disc and the rod as well as the contact stiffness has a main influence on the vibration intensity and collision rebound forms.

Jiang and Xiao (2004) evaluated factorial cross analysis of pre harvest sprouting resistance in white wheat. The lack of understanding of the genetics of sprouting resistance as well as the lack of white wheat germ plasm with sprouting resistance is impeding the development and production of white wheat cultivars. Two sets of factorial crosses were made with 15 white wheat genotypes possessing different origins and different levels of sprouting resistance. In experiment I (5 _10), it was shown that the General Combining Ability (GCA) effects of resistant (male) and susceptible (female) parents, and Specific Combining Ability (SCA) effects were highly significant based on both single-year analysis and 2-year combined analysis. There was a significant genotype-year interaction, and the performance of F1 hybrids was more vulnerable to environments than that of the parents. Hybrids have a greater risk of suffering from the sprouting damage than the pure lines. In experiment II (4 _ 4), both GCA and SCA effects were significant for F2s. Cultivars FLXXM, WXBMZ, SNTTM, ZTNEM and Fengchan 3 had higher sprouting resistance and are thus good donors in white wheat breeding programs for sprouting resistance.

Ali *et al.,* 2005 studied the deforestation in the Himalayas is generally seen as caused primarily by population growth. Based on interviews and the analysis of satellite images, critically examine this view using Basho Valley in the Western Himalayas of Pakistan as a case study. The findings indicate that the forest of Basho has been reduced by at least 50% after the valley was opened up through the construction of a link road in 1968. Large scale legal and illegal commercial harvesting was carried out after the construction of the road. While legal commercial harvesting was stopped in 1987, illegal harvesting has since continued with the involvement of the Forest Department. The findings of this study do not support theories in which deforestation is attributed to rapid population growth. Instead, mismanagement and illegal commercial harvesting endorsed by the Forest Department have been the main causes of deforestation in Basho Valley.

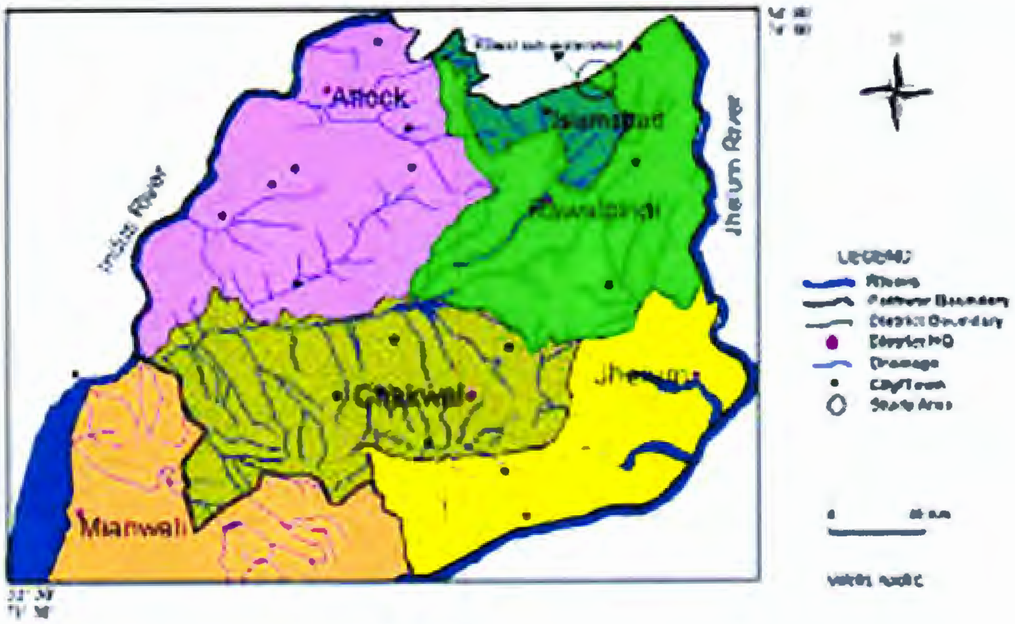
Saqib *et al.*, 2016 studied the explanatory research design to investigate the causal relationship between the dependent (binary) and independent variables. Data were collected through survey and checklist from 168 farmers in the study area of Mardan. Probit model was employed to explore the said relationships. Risk perception, risk attitude and access to credit were calculated for each individual and used as independent variables along with other socio economic factors. Results from Probit estimation showed that over all model was a good fit, most of the socio-economic factors were found significant. Experience, education, risk perception of heavy rains, income, distance and access to credit sources had positive relationship with the adoption of agricultural credit.

3 Materials and Methods

3.1 Study Area

The study was conducted at National Agricultural Research Centre (NARC), Islamabad. Islamabad is situated at 33.43^0 N 73.04^0 E at the edge of the Pothwar plateau at the end of the Margalla Hills in the Federal Islamabad Capital Territory and its altitude is 507 meters (1,663ft).Islamabad topographies and a typical kind of a moist subtropical climate, with hot, humid summers go along with a monsoon seasons followed by cool winters. The soil of the region are local outwash or loessic, alluvial in source. These are temperately calcareous and their lime contents equally distributed all over the soil profile. The soils of the region are non-sodic and non-saline, have a little alkaline pH and have little inorganic substance.

The Pothwar plateau chiefly involves Attock, Chakwal, Rawalpindi, Islamabad and Jhelum districts cover a part of more than one million hectares. This rain fed tract pays considerably to agricultural and livestock production (Supple *et al.*, 1988). The soils of this area are low in natural fertility, poor in nitrogen and phosphorous; though, potassium level is suitable. In the same way, the soils are also low in organic material and ensuring pH of 7.5 to 8.5 (Ahmad *et al.*, 1990).



(Source Google Image)

Rainfall is irregular and differs significantly from 250 mm in south-west to 1000 mm in the north-east portion of the area. In the summer months more than 70% of annual rain falls. Rainfall, being a main cause of moisture for crops, is the most important yield-limiting issue in the area, while further more factors such as water and soil water conservation practices, excessive tillage, low soil fertility, operations and lack of apposite practices are also vital in Pothwar plateau. The rain fed atmosphere for crop growing is very fragile and has limits for water, soil and crop management. Even though, the tract has massive power to share significant magnitude of crop production to address the food security problem of the nation state (Razzaq *et al.*, 1990; Khan & Rizwan *et al.*, 2000).

3.2 Details of the study

There were three treatments of media in which seeds were sown.

3.2.1 Farmyard Medium

First medium was prepared by mixing Farmyard manure and silt farmyard manure was obtained from livestock research station, National Agricultural Research Centre (NARC). It was ensured that farmyard manure was properly decayed for at least six months so that weeds could not emerge out of this medium. Silt was obtained from the riverbed of the Korang River. Farmyard manure and silt were mixed with the ratio of 1:1 to make the ideal bed culture. This mixture was passed through mesh to obtain even sized grain particles.

3.2.2 Compost Medium

Second medium consisted of compost + sand+ soil. Compost was obtained from the recently installed compost plant which prepares compost of decomposed plant material mixed with essential nutrients. Sand was obtained from the construction site at NARC. Soil was obtained from the field area of Rangeland Research Institute in which no fertilizer had been added. Compost, sand and soil were mixed in the ratio of 1:1:1 to make the medium. This medium was also passed through mesh to get uniform sized particles.

3.2.3 Soil Medium

Third medium consisted of soil only in which no fertilizer had been added. The soil was grained and also passed through mesh.

3.3 Procedure

Polythene tubes of seven inch long and four inch wide sized were filled with the respective medium. There were fifty assigned per species. The tubes were arranged and packed in the nursery bed. Ten multipurpose tree species obtained from plus trees obtained from different areas of Islamabad during 2013 – 2014 were used for the present study.

Seeds were sown on 10 August 2016 during the monsoon seasons in the polythene tubes. Seeds were sown in the polythene tubes and covered with half inch deep potting medium and were watered. After that the tubes were watered daily and germination was recorded daily for two week. Emergence of first and third leave was also recorded. After two weeks five plants at random of each species were uprooted and measured for root length and shoot length. Roots and shoot were separated and fresh weight of root and shoot was weight separately. Fresh roots and shoots were placed in an oven maintained at 80 C for 24 hrs and dry weight was also recorded. The experiment was conducted in a Randomized complete block design and analyzed for comparison by means of method describe by Steel and Torrie (1997).

3.4 Multipurpose tree species

Following ten multipurpose tree species were sown includes

- Sukh chain (*Pongamia glabra), L.*
- Phulai *(Acacia modesta), Wall.*
- IpleIple *(Leucacenaleucocephala), Lam de wit.*
- Kala Shirin *(Albizzia lebbek), L.*
- White kikar *(Acacia albida),Delile.*
- Kikar *(Acacia nilotica), L.*
- African kikar *(Acacia tortilis), Forssk.*
- Amaltas *(Cassia fistula), Willd.*
- Parkinsonia *(Parkinsonia aculeata), L.*
- Kachnar *(Bauhinia variegata), L.*

3.5 Data Collection

Data was collected every day for 2 weeks. Following eight factors were recorded.

- Germination of seeds
- Days to seed germination
- Days to appearance of first leave
- Days to appearance of 3 leaves
- Plant height
- Root length
- Root/shoot ratio
- Fresh and Dry matter

4 Results

4.1 Seed Germination

Seeds of different multipurpose tree species were sown on 10 August 2016. There were 3 different potting medium of farmyard manure +silt +soil, compost + sand and soil only. Tubes were watered daily and emergence of seedlings was monitored in each medium. Germination data was recorded for about 15 days during the monsoon period. Results are given in Table 1.

Table 1 Number of multipurpose tree seeds germinated after sowing under different growth media.

		Date of sowing 10-8-2016												
Species														
Farm yard	**Date**	15-8-2016	16-8-2016	17-8-2016	18-8-2016	19-8-2016	22-8-2016	23-8-2016	24-8-2016	25-8-2016	26-8-2016	29-8-2016	30-8-2016	31-8-2016
Pongamiaglabra		0	0	0	0	0	0	1	2	5	8	9	9	9
Acacia modesta		0	0	0	2	5	5	7	8	9	9	9	12	13
Leucaena leucocephala		0	0	10	14	14	15	16	16	18	18	19	21	22
Albizzia lebbek		2	4	5	6	8	9	11	11	11	14	14	14	14
Acacia albida		0	3	3	3	3	4	4	5	6	8	5	8	9
Acacia nilotica		0	2	3	3	3	3	6	7	8	8	11	11	11
Acacia tortilis		0	2	2	2	2	2	2	6	7	7	7	7	7
Cassia fistula		0	0	0	0	1	2	2	6	7	5	7	9	13
Parkinsonia aculeata		5	12	14	17	18	19	19	20	21	21	21	22	24
Bauhinia variegate		10	11	15	18	20	22	21	23	23	23	23	23	23
Compost	**Date**	15-8-2016	16-8-2016	17-8-2016	18-8-2016	19-8-2016	22-8-2016	23-8-2016	24-8-2016	25-8-2016	26-8-2016	29-8-2016	30-8-2016	31-8-2016
Pongamia Glabra		0	0	0	0	0	0	1	2	5	5	6	6	6
Acacia modesta		0	0	0		2	4	6	8	9	10	11	11	11
Leucaena leucocephala		0	0	9	10	10	12	15	16	18	22	22	22	22
Albizzia lebbek		0	0	2	4	6	7	8	8	8	10	10	10	10
Acacia albida		0	1	2	2	3	3	4	5	5	5	5	7	9
Acacia nilotica		0	0	2	3	3	3	3	5	6	8	9	9	9
Acacia tortilis		0	0	0	2	2	2	2	4	4	4	4	5	5
Cassia fistula		0	0	0	0	1	2	2	6	7	5	7	9	13

Parkinsonia aculeata		5	8	8	12	14	15	16	18	19	19	19	20	20
Bauhinia variegate		10	10	15	15	15	15	15	23	23	23	23	23	24
Soil	**Date**	15-8-2016	16-8-2016	17-8-2016	18-8-2016	19-8-2016	22-8-2016	23-8-2016	24-8-2016	25-8-2016	26-8-2016	29-8-2016	30-8-2016	31-8-2016
Pongamia Glabra		0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia modesta		0	2	2	2	2	2	2	2	3	3	3	3	3
Leucaena leucocephala		0	0	0	0	0	8	8	8	8	8	8	10	10
Albizzia lebbek		2	2	2	2	2	2	2	2	2	2	2	2	2
Acacia albida		0	0	1	1	1	1	1	2	3	5	5	7	7
Acacia nilotica		0	0	0	0	0	1	1	1	1	1	3	7	7
Acacia tortilis		0	0	0	0	1	4	4	5	5	5	5	5	7
Cassia fistula		0	0	0	0	0	3	3	5	5	5	5	5	6
Parkinsonia aculeata		6	6	6	6	6	6	6	6	8	10	10	10	10
Bauhinia variegate		4	6	6	6	8	8	8	12	12	14	14	14	14

It's clear from the Table that germination was generally higher in case of farmyard manure medium, followed compost and minimum in case of soil. Different tree seeds were sown on 10-8-2016 and observation started after 5 days on 15-8-2016. Germination of 3 species started earlier than other species. Two seeds of *Albizzia lebbek* germinated and after 6 days first leave appeared and after 8 days third leave appeared, Five of *Parkinsonia aculeatea* and first leave appeared after 6 days and third leave after 8 days of sowing and 10 seeds germinated in case of *Bauhinia variegata* in farmyard manure medium and first leave after 6 days and third leave after 8 days. Same tree species germinated in compost and in soil but in different numbers. 5 seeds of *parkinsonia aculeata* germinate and 10 of *Bauhinia variegata* in compost. Two seeds germinated in case of *Albizzia lebbek*, 6 seeds of *Parkinsonia aculeata* and 4 only seeds of *Bauhinia variegate* germinated in soil.

First seed of *Pongamia glabra* started germination on 23 August 2016 after 12 days of sowing. First leave appeared after 13 days and third leave appeared after 15 days. After 8 days on 18.8.2016, *Acacia modesta* germinate first leave appeared after 9 days and third leave appeared after 11 days, *Leucaena leucocephala* germinate after 7 days of sowing on 17.8.2016, first leave appeared after 8 days and third leave appeared after 10 days, *Albizzia lebbek, parkinsonia aculeatea* and *Bauhinia variegata* after 5 days of sowing on 15.8.2016, first leave appeared after 6 days and third leave appeared after 8 days of sowing. *Acacia albida, Acacia nilotica, Acacia tortilis* and *Cassia fistula* germinate after 6 days on 16.8.2016 and their first leave appeared after 7 days and third leave appeared after 9 days in farmyard manure.

In compost first seed of *Pongamia glabra* started germination on 23 August 2016 after 12 days of sowing and first leave appeared after 13 days and third leave appeared after 15 days. *Acacia modesta* after 9 days on 19.8.2016 germinate and first leave appeared after 10 days and third leave appeared after 12 days, *Leucaena leucocephala, Albizzia lebbek* germinated on 17.8.2016 after 7 days and first leave appeared after 8 days and third leave appeared after 10 days, *Acacia albida* germinated on 16.8.2016 after 6 days there first leave appeared after 7 days and there third leave appeared after 9 days, *Acacia nilotica* germinate after 7 days of sowing on 17.8.2016 and their first leave appeared after 8 days and third leave appeared after 10 days, *Parkinsonia aculeatea* and *Bauhinia variegate* on 15.8.2016 germinated after 5 days of sowing and their first leave appeared after 6 days and their third leave appeared after 8 days of sowing. *Acacia albida, Acacia tortilis* on 18.8.2016 germinated after 8 days of sowing and first leave appeared after 9 days and third leave appeared after 11 days. *Cassia fistula* germinates after 9 days of sowing on 19.8.2016 and first leave appeared after 10 days and third leave appeared 12 days.

In soil medium, no seed of *Pongamia glabra* germinated, *Acacia modesta* germinated after 6 days of sowing on 16.8.2016 and first leave appeared after 7 days and third leave appeared after 9 days, *Leucacena leucocephala* germinated on 22.8.2016 after 12 days of sowing and first leave appeared after 13 days and third leave appeared after 15 days, *Albizzia lebbek* germinated after 5 days of sowing on 15.8.2016 and first leave appeared after 6 days and third leave appeared after 8 days, *Acacia albida* germinated after 7 days on 17.8.2016 and first leave appeared after 8 days and third leave appeared after 10 days, *Acacia nilotica* and *Cassia fistula* first seed germinated after 10 days on 20.8.2016 and first leave appeared after 11 days and third leave appeared after 13 days, *Acacia tortilis* germinated on 19.8.2016 and first leave appeared after 10 days and third leave appeared after 12 days, *Parkinsonia aculeatea and Bauhinia variegata* germinated on 5 days after sowing on 15.8.2016 and first leave appeared after 6 days and third leave appeared after 8 days of sowing.

Data recorded on 16-8-2016, two more seeds *Albizzia lebbek* germinated make it total of 4 seeds, *Acacia albida* 3, *Acacia nilotica* 2, *Acacia tortilis* 2, 7 more seeds of *Parkinsonia aculeata make it total of* 12 and 1 more seed of *Bauhinia variegata make it total of* 11 seeds germinate in farmyard manure. In compost, *Acacia albida* 1 seed germinate 3 more seeds of *Parkinsonia aculeata* make it total of 8 and 10 seeds of *Bauhinia variegata* and in compost. 2 seeds germinate of *Acacia modesta* 2 seeds of *Albizzia lebbek* 6 seeds of *Parkinsonia aculeate* and 2 more seeds of *Bauhinia variegata* make it total of 6 in soil.

Observance on 17-8-2016, was recorded some more seeds germinated. Ten seeds of *Leucaena leucocephala* germinated for the first time, 1 more seed of *Albizzia lebbek* making it total of 5, 3 seeds of *Acacia albida,* and 1 more seeds of *Acacia nilotica* make it total of 3, 2 seeds of *Acaciatortilis*, 2 more seeds of *Parkinsonia aculeata* make it total of 14 and 4 more seeds of *Bauhinia variegata* making it total of 15 germinated in farmyard manure medium. In compost, 9 seeds of *Leucaena leucocephala* germinated, 2 seeds of *Albizzia lebbek*, 1 more seeds of *Acacia albida* germinate and make it total of 2 and 2 seeds of *Acacia nilotica*, 8 seeds germinate of *Parkinsonia aculeata* and 5 more seeds of *Bauhinia variegate* making it total of 15 seeds germinated. In soil, 2 seeds of *Acacia modesta*, 2 seeds of

Albizzialebbek, 1 seed of *Acacia albida*, and 6 seed of *Parkinsonia aculeata* and 6 seeds of *Bauhinia variegata* germinated.

Observation made on 18-8-2016 revealed that 2 seeds germination of *Acacia modesta*, 4 more seeds *Leucaena leucocephala* making it total of 14, 1 more seed of *Albizzia lebbek* makes it total of 6, 3 seeds of *Acacia albida*, 3 seeds of *Acacia nilotica*, 2 seeds of *Acacia tortilis*, 3 more seeds *Parkinsonia aculeata making* it total of 17 and 3 more seeds *Bauhinia variegata* makes it total 18 seeds germinated in farmyard manure medium. In compost medium, 1 more seeds of *Leucaena leucocephala* making it total of 10 seeds germinated, 2 more seeds of *Albizzia lebbek* making it total of 4, 2 seeds of *Acacia albida*, 1 more seeds of *Acacia nilotica* making it total of 3, 2 seeds of *Acacia tortilis*, 4 more seeds of *Parkinsonia aculeata*germinate and making it total of 12 and 15 of *Bauhinia variegata* germinated while in soil medium, 2 seeds of *Acacia modesta*, 2 seeds *Albizzia lebbek*, 1 seed of *Acacia nilotica*, 6 seeds of *Parkinsoniaaculeata* and 6 seeds of *Bauhinia variegata* germinated.

On 19-8-2016, 3 more seeds of *Acacia modesta* germinated makes it total of 5 seeds,14 seeds of *Leucaena leucocephala*, 2 more seeds of *Albizzia lebbek* making it total of 8 seeds germinated, 3 seeds of *Acacia albida*, 3 seeds of *Acacia nilotica*, 2 seeds of *Acacia tortilis*,1 seed of *Cassia fistula*,1 more seeds of *Parkinsonia aculeata* making it total of 18 seeds germinated, and 2 more seeds of *Bauhinia variegata* making it total of 12 seeds germinated in the farmyard manure medium. In the compost medium, 2 seeds germinated were observed in case of *Acacia modesta*, 10 seeds in *Leucaena leucocephala*, 2 more seeds of *Albizzia lebbek* making it total of 6 seeds germinated, 1 more seeds of *Acacia albida* germinate making it total of 3, 3 seeds of *Acacia nilotica*, 2 seeds of *Acacia tortilis*, 1 seed of *Cassia fistula*, 2 more seeds of *Parkinsonia aculeata* germinate making it total of 14 seeds and 15 seeds germinate in *Bauhinia variegata*. In the ordinary soil medium, 2 seeds of *Acacia modesta* were observed germinated, 2 seeds of *Albizzia lebbek*, 1 seed of *Acacia albida*, 1 seeds of *Acacia tortilis*, 6 seeds of *Parkinsonia aculeata* and 2more seeds of *Bauhinia variegata* making it total of 8 seeds germinated.

Observations recorded on 22-8-2016 in farmyard manure revealed that 5 seeds of *Acacia modesta* germinated 1 more seed germinate in *Leucaena leucocephala* making it total of 15,1 more seed of *Albizzia lebbek* making it total of 9 seeds germinates, 1 more seed of *Acacia albida* making it total of 4 seeds germinated,3 seeds of *Acacia nilotica*, 2 seeds of *Acacia tortilis*, 1 more seed of *Cassia fistula* germinate making it total of 2,1 seed

Parkinsonia aculeata germinate and making it total of 19, 2 more seeds of *Bauhinia variegata* germinated and making it total of 22 seeds. In compost 2 more seeds of *Acacia modesta* germinated making it total of 4 seeds, 2 more seeds of *Leucaena leucocephala* makes it total of 12 seeds germinated, 1 more seed of *Albizzia lebbek* making it total of 7 seeds germinated, 3 seeds of *Acacia albida*, 3 seeds of *Acacia nilotica*, 2 seeds Acacia tortilis, 1 more seed of *Cassia fistula* germinate and making it total of 2, 1 more seed of *Parkinsonia aculeata* germinated and making it total of 15 seedsand 15 seeds germinated in *Bauhinia variegata*. In soil, 2 seeds germinate in *Acacia modesta*, *Leucaena leucocephala* germinated 8 seeds, 2 seeds of *Albizzia lebbek*, 1 seed of *Acacia albida*, 1 seed of *Acacia nilotica*, 3 more seeds of *Acacia tortilis* germinated making it total of 4 seeds, 3 seeds of *Cassia fistula*,6 seeds of *Parkinsonia aculeata* and 8 seeds of *Bauhinia variegata* germinated.

Observation noted on 23-8-2016 in farmyard manure revealed that 1 seed germinated in case of *Pongamia glabra*, 2 more seeds germinated in case of *Acacia modesta* making it total of 7 seeds, 1 more seed germinated in *Leucaena leucocephala* making it total of 16, 3 more seeds of *Albizzialebbek* making it total of 11 seedsgerminated, 4 seeds of *Acacia albida*, 3 more seeds of *Acacia nilotica* germinated making it total of 6 seeds, 2 seeds of *Acacia tortilis*, 2 seeds of *Cassia fistula*, 19 seeds *Parkinsonia aculeata*, 21 seeds of *Bauhinia variegata* germinated. In compost 1 seed germinated in *Pongamia glabra*, 2 more seeds of *Acacia modesta* germinated and making the total of 6 seeds germinated, 3 more seeds of *Leucaena leucocephala* germinated and making it total of *15* seeds, 1 more seed of *Albizzia lebbek* making it total of 8 seeds, 1 more seed of *Acacia albida* making it total of 4 seeds germinated, 3 seeds of *Acacia nilotica*, 2 seeds *Acacia tortilis*, 2 seeds of *Cassia fistula*, 1 more seed of *Parkinsonia aculeata* and making it total of 16 seeds germinated and 15 seeds germinated in *Bauhinia variegata*. In soil 2 seeds germinated in *Acacia modesta*, *Leucaena leucocephala* germinate 8 seeds, 2 seeds of *Albizzia lebbek*, 1 seed of *Acacia albida*, 1 seed of *Acacia nilotica*, 4 seeds of *Acacia tortilis*, 3 seeds of *Cassia fistula*, 6 seeds of *Parkinsonia aculeata* and 8 seeds of *Bauhinia variegata* germinated.

According to data recorded on 24-8-2016 in farmyard manure treatment, 1 more seed germinated in case of *Pongamiaglabra* and making it total of 2 seeds, 1 more seed germinated of *Acacia modesta* and making total of 8, 16 seeds germinate in *Leucaena leucocephala*, 11 seeds of *Albizzia lebbek*, 1 more seed of *Acacia albida* germinated and making total of 5 seeds, 1 more seed of *Acacia nilotica* and germinated and making total of 7 seeds, 4 more seeds of *Acacia tortilis* and total of 6seeds germinated, 4 more seeds of *Cassia fistula* germinated and making it total of 6 seeds, 1 more seed of *Parkinsonia aculeata* germinated and making it total of 21, 2 more seeds of *Bauhinia variegata* germinated and total of 23 seeds. In compost medium seed germination of *Pongamia glabra* increase to 2, 2 more seeds of *Acacia modesta* germinated and making a total of 8 seeds, 1 more seed of *Leucaena leucocephala* germinated and making a total of 16, 8 seeds of *Albizzia lebbek*, 1 more seed of *Acacia albida* and total of 5 seeds germinate, 2 more seeds of *Acacia nilotica* germinated and making it total of 5, 2 more seeds *Acacia tortilis* germinated making it total of 4 seeds , 4 new seeds of *Cassia fistula* germinate making total of 6 seeds, 2 other seeds of *Parkinsonia aculeata* germinatedmaking it total of 18 seeds and 8 further seeds germinated in *Bauhinia variegata* making total of 23 seeds. In soil medium, 2 seeds germinated in *Acacia modesta*, *Leucaena leucocephala* germinate 8 seeds, 2 seeds of *Albizzia lebbek*, 2 seed of *Acacia albida*, 1 seed of *Acacia nilotica*, 1 new seed of *Acacia tortilis* and total of 5 seeds germinated, 2 further seeds of *Cassia fistula* and created 5 seeds to germinated, 6 seeds of *Parkinsonia aculeata* and 4 new seeds of *Bauhinia variegata* germinate making total of 12 seeds.

Data recorded on 25-8-2016 revealed that in farmyard manure 3 new seeds germinated of *Pongamia glabra* making total of 8 seeds, 1 more seed germinated of *Acacia modest* making total of 9, 2 further seeds germinated in *Leucaena leucocephala* making total of 18, 11 seeds germinated in *Albizzia lebbek*, 1 more seed of *Acacia albida* germinated making total of 6 seeds, 1 more seed of *Acacia nilotica* germinated making total of 8 seeds, 1 new seed of *Acacia tortilis* germinated making total of 7 seeds, 1 further seed of *Cassia fistula* germinated making total of 7 seeds, 1 other seed of *Parkinsonia aculeata* and total of 21 seeds germinated, 23 seeds of *Bauhinia variegata* germinated. In compost medium 3 new seeds germinated in *Pongamia glabra* making total of 5 seeds, 1 more seed of *Acacia modesta* germinated making total of 9 seeds, 2 further seeds of *Leucaena leucocephala* germinated making total of 18 seeds, 8 seeds of *Albizzia lebbek*, 5 seeds of *Acacia albida*, 1 more seed of *Acacia nilotica* making total of 6 seeds, 4 seeds *Acacia tortilis*, 1 other seed of *Cassia fistula* germinated making total of 7 seeds, 19 seeds of *Parkinsonia aculeata* and 23 seeds germinated in *Bauhinia variegata*. In soil medium 1 more seed germinated in *Acacia modesta* making total of 3 seeds, *Leucaena leucocephala* germinate 8 seeds, 2 seeds of *Albizzia lebbek*, 1 new seed of *Acacia albida* germinated and making total of 3 seeds, 1 seed of *Acacia nilotica*, 5 seeds of *Acacia tortilis*, 5 seeds of *Cassia fistula*, 2 further seeds of

Parkinsonia aculeata germinate and making total of 8 seeds and 12 seeds of *Bauhinia variegata* germinated.

According to observations noted on 26-8-2016 in the medium of farmyard manure 3 new seeds germinated in *Pongamia glabra* and making total 8 seeds germinated, 9 seeds germinated of *Acacia modesta*, 18 seeds germinated in *Leucaena leucocephala*, 3 other seeds *Albizzia lebbek* germinated making total of 14 seeds, 2 further seeds germinated in *Acacia albida* and total become 8 seeds, 8 seeds of *Acacia nilotica*, 7 seeds of *Acacia tortilis*, 5 seeds of *Cassia fistula*, 21 seeds germinated in *Parkinsonia aculeata*, 23 seeds of *Bauhinia variegata* germinated. In compost medium 5 seed germinated in *Pongamia glabra*, 1 other seeds of *Acacia modesta* germinated and making total of 10 seeds germinated, 4 new seeds of *Leucaena leucocephala* making total of 22 seeds germinated, 2 further seeds of *Albizzia lebbek* germinated and making total of 10 seeds, 5 seeds of *Acacia albida*, 2 new seeds of *Acacia nilotica* and making total 8 seeds germinated, 4 seeds *Acacia tortilis*, 5 seeds of *Cassia fistula*, 19 seeds of *Parkinsonia aculeata* and 23 seeds germinated in *Bauhinia variegata*. In soil medium 3 seeds germinated in *Acacia modesta*, *Leucaena leucocephala* germinated 8 seeds, 2 seeds of *Albizzia lebbek*, 2 new seeds of *Acacia albida and total of 5 seeds germinate*, 1 seed of *Acacia nilotica*, 5 seeds of *Acacia tortilis*, 5 seeds of *Cassia fistula*, 2 more seeds of *Parkinsonia aculeata* germinate makes total of 10 seeds and 2 further seeds of *Bauhinia variegata* germinate and total of 14 seeds.

Observations noted on 29-8-2016 revealed that in the farmyard manure medium, 1 new seed germinated in *Pongamia glabra* and making total of 9 seeds, 9 seeds germinated in *Acacia modesta*, 1 more seed germinated in *Leucaena leucocephala* and making total of 19 seeds germinated, 14 seeds germinate in *Albizzia lebbek*, 5 seeds of *Acacia albida*, 3 further seeds in *Acacia nilotica* and making total of 11 seeds germinate, 7 seeds of *Acacia tortilis*, 2 other seeds of *Cassia fistula* germinate making total of 7 seeds, 21 seeds germinated in *Parkinsonia aculeata*, 23 seeds of *Bauhinia variegata* germinated. In compost medium 1 new seed germinated in *Pongamia glabra* making total of 6 seeds, 1 other seed of *Acacia modesta* germinated and making total of 11 seeds, 22 seeds of *Leucaena leucocephala* germinated, 10 seeds of *Albizzia lebbek* germinated, 5 seeds germinated in *Acacia albida*, 1 new seed of *Acacia nilotica* germinated making total 9 seeds, 4 seeds germinated in *Acacia tortilis*, 2 further seeds germinated of *Cassia fistula* making total of 7 seeds, 19 seeds germinated in *Parkinsonia aculeata* and 23 seeds germinated in *Bauhinia variegata*. In the soil medium, 3 seeds germinated in *Acacia modesta, Leucaena leucocephala* germinated 8 seeds, 2 seeds of *Albizzia lebbek,* 5 seeds of *Acacia albida,* 2 new seeds of *Acacia nilotica* germinated andmaking total of 3 seeds, 5 seeds of *Acacia tortilis* germinated, 5 seeds of *Cassia fistula* germinated, 10 seeds of *Parkinsonia aculeata* and 14 seeds of *Bauhinia variegata* germinated.

It is clear from the data recorded on 30-8-2016 that in the farmyard manure medium, 9 seeds germinated of *Pongamia glabra,* 3 new seeds of *Acacia modesta* germinated and making total of 12 seeds, 2 new seeds germinated in *Leucaena leucocephala* making total of 21 seeds, 14 seeds germinated in *Albizzia lebbek,* 8 seeds of *Acacia albida* germinated, 11 seeds of *Acacia nilotica* germinated, 7 seeds germinate in *Acacia tortilis,* 2 more seeds of *Cassia fistula* and total of 9 seeds germinated, 1 other seedof *Parkinsonia aculeata* germinated and making total of 22 seeds, 23 seeds of *Bauhinia variegata* germinated. In compost medium 6 seeds germinated in *Pongamia glabra,* 11 seeds of *Acacia modesta* germinated, 22 seeds of *Leucaena leucocephala* germinated, 10 seeds germinated in *Albizzia lebbek,* 2 more seeds of *Acacia albida* germinated and making total of 7 seeds, 9 seeds germinated in *Acacia nilotica,* 1 new seed germinated in *Acacia tortilis* and making total of 5 seeds, 2 more seeds of *Cassia fistula* germinated and making total of 9 seeds, 1 new seed of *Parkinsonia aculeata* germinated and making total of 20 seeds and 23 seeds of *Bauhinia variegata* germinated. In soil medium, 3 seeds germinated in *Acacia modesta,* 2 more seeds of *Leucaena leucocephala* germinated making total of 10 seeds, 2 seeds of *Albizzia lebbek,* 2 more seeds of *Acacia albida* germinated and making total of 7 seeds, 4 new seeds of *Acacia nilotica* germinated making total of 7 seeds, 5 seeds of *Acacia tortilis* germinated, 5 seeds of *Cassia fistula* germinated, 10 seeds of *Parkinsonia aculeata* and 14 seeds of *Bauhinia variegata germinated.*

According to observations recorded on 31-8-2016, in the farmyard manure medium, 9 seeds germinated of *Pongamia glabra,* 1 new seed germinated of *Acacia modesta* making total of 13 seeds, 1 new seed germinated in *Leucaena leucocephala* making total of 22 seeds, 14 seeds germinated in *Albizzia lebbek,* 1 further seed of Acacia albida germinated making total of 9 seeds, 11 seeds of *Acacia nilotica* germinate, 7 seeds of *Acacia tortilis* germinated, 4 new seeds of *Cassia fistula* germinated and making total of 13 seeds, 2 new seeds germinated in *Parkinsonia aculeata* making total of 24 seeds and 23 seeds of *Bauhinia variegata* germinated. In compost medium, 6 seed germinated in *Pongamia glabra,* 11 seeds of *Acacia modesta* germinated, 22 seeds of *Leucaena leucocephala*, 10 seeds of *Albizzia lebbek*, 2 new seeds of *Acacia albida* germinatedand making total of 9 seeds, 9 seeds of *Acacia nilotica* germinated, 5 seeds germinated in *Acacia tortilis*, 4 new seeds of *Cassia fistula* germinated making total of13 seeds, 20 seeds of *Parkinsonia aculeata* and 1 new seeds germinated in *Bauhinia variegata* making total of 24 seeds. In the soil medium, 3 seeds germinated in *Acacia modesta*, *Leucaena leucocephala* germinated 10 seeds, 2 seeds of *Albizzia lebbek*, 7 seeds of *Acacia albida*, 7 seeds of *Acacia nilotica* germinated, 2 more seeds of *Acacia tortilis* germinated making total of 7 seeds, 1 new seed of *Cassia fistula* germinated making total of 6 seeds, 10 seeds of *Parkinsonia aculeata* and 14 seeds of *Bauhinia variegata* germinated.

Table 2 Average germination of different multipurpose tree seeds under different growth media.

	Species	Farmyard	Compost	Soil	Average
1	*Pongamia glabra*	9.00 DEFG	6.00 H	0.67 K	5.00 F
2	*Acacia modesta*	11.33 CD	11.00 D	3.00 IJ	8.22 CD
3	*Leucacena leucocephala*	20.67 AB	22.00 AB	9.33 DEF	17.33 B
4	*Albizzia lebbek*	14.00 C	10.00 DE	2.00 DEF	8.67 C
5	*Acacia albida*	7.33 EFGH	7.00 FGH	6.33 GH	8.56 C
6	*Acacia nilotica*	11.00 D	9.00 DEFG	5.66 HI	8.56 C
7	*Acacia tortilis*	7. 00 FGH	4.67 HIJ	5.66 HI	5.77 EF
8	*Cassia fistula*	9.68 DEF	9.67 DEF	5.33 HI	8.22 CD
9	*Parkinsonia aculeate*	22.33 AB	19.67 B	10.00 DE	17.33 B
10	*Bauhinia variegata*	23.00 A	23.33 A	14.00 C	20.11A

The results of Duncan's New Range Test, numbers sharing different letters are statistically at P<0.5

An average seed germination of different tree seeds grown under different growth media is given in Table 2. It is clear from the above table that maximum germination percentage in farmyard manure was found. *Bauhinia variegata* which was statistically higher (23.00%) from all other species except *Parkinsonia aculeata.Parkinsonia aculeata* had higher seed germination of (22.33%) followed by *Leucacena leucocephala* (20.67%), *Albizzia lebbek* (14.00%), *Acacia modesta* (11.33%), *Acacia nilotica* (11.00%), *Cassia fistula* (9.67%), *Pongamia glabra* (9.00%), *Acacia albida* (7.33%), and *Acacia tortilis* (7.00%). In compost, *Bauhinia variegata* had highest germination (23.33%) followed by *Leucacena leucocephala* (22.00%), *Parkinsonia aculeata* (19.67%), *Acacia modesta* (11.00%), *Albizzia lebbek* (10.00%), *Cassia fistula* (9.67%), *Acacia nilotica* (9.00%), *Acacia albida* (7.00%), *Pongamia glabra* (6.00), *Acaciatortilis* (4.66). In soil media maximum seed germination was observed *Bauhinia variegata* (14.00%) which had higher germination followed by *Parkinsonia aculeata* (10.00%), *Leucacena leucocephala* (9.33%), *Acacia modesta* (8.22%), *Acacia albida* (6.33%), *Acacia nilotica* (5.6%), *Acacia tortilis* (5.6%), *Cassia fistula* (5.33%), *Albizzia lebbek* (2.00%), and least in *Pongamia glabra* (0.67%).

An average comparison of seed germination for species revealed that *Bauhinia variegata* had statistically higher germination (20.11%) followed by *Leucacena leucocephala* (17.33%), *Parkinsonia aculeata* (17.33%), *Albizzia lebbek* (8.6%), *Acacia nilotica* (8.55%), *Acacia albida* (8.55%), *Cassia fistula* (8.22%), *and Acacia modesta* (8.22%) *Acacia tortilis* (5.7%) and *Pongamia glabra* (5.00%)

Table 3 Percentage germination of different multipurpose tree seeds under different growth media.

	Species	Farmyard	Compost	Soil	Percentage
1	*Pongamia glabra*	18	12	1	10
2	*Acacia modesta*	26	22	6	18
3	*Leucacena leucocephala*	44	44	20	36
4	*Albizzia lebbek*	28	20	4	17.33
5	*Acacia albida*	18	18	14	16.66
6	*Acacia nilotica*	22	18	14	18
7	*Acacia tortilis*	14	10	14	12.66
8	*Cassia fistula*	26	26	12	21.33
9	*Parkinsonia aculeata*	48	40	20	36
10	*Bauhinia variegata*	46	48	28	40.66

Percentage of seed germination of different multipurpose tree species under different growth media is given in Table 3. Highest seed germination percentage was observed in the medium of farmyard. As regards differences among species, it is clear from the Table that highest percentage seed germination was observed in *Parkinsonia aculeata*(48%) followed by *Bauhinia variegata* (46%), *Leucacena leucocephala* (44%), *Albizzia lebbek* (28%), *Acacia modesta* (26%), *Cassia fistula* (26%), *Acacia nilotica* (22%), *Acacia albida* (18%), and *Pongamia glabra* (18%) and least in *Acacia tortilis* (14%)

In the compost medium, it is clear from the Table that highest percentage of seed germination was observed in *Bauhinia variegata* (48%), followed *Parkinsonia aculeata* (40%) *Leucacena leucocephala* (44%), *Cassia fistula* (26%), *Acacia modesta* (22%), *Albizzia* *lebbek* (20%), *Acacia nilotica* (18%), *Acacia albida* (18%), *Pongamia glabra* (12%) and *Acacia tortilis* (10%)

In field of soil medium, it is clear from the Table that highest percentage seed germination was observed in *Bauhinia variegata* (28%), followed *Parkinsonia aculeata* (20%) *Leucacena leucocephala* (20%), *Acacia nilotica* (14%), *Acacia albida* (14%), *Acacia tortilis* (14%), *Cassia fistula* (12%), *Acacia modesta* (6%), *Albizzia lebbek* (4%), and *Pongamia glabra* (10%)

Average percentage of seed germination of different multipurpose tree species under different growth media was obtained higher in *Bauhinia variegata* (40.66%), followed *Parkinsonia aculeata* (36%) *Leucacena leucocephala* (36%), *Cassia fistula* (21.33%), *Acacia nilotica* (18%), *Acacia modesta* (18%), *Albizzia lebbek* (17.33%), *Acacia albida* (16.66), *Acacia tortilis* (12.66) and *Pongamia glabra* (10%)

Table 4 Difference of Shoot length, Root length and their ratio among different species

S. No	Species	Shoot length, cm	Root length, cm	Root/Shoot Ratio
1	*Pongamia glabra*	42.8 A	13.36 C	0.56 B
2	*Acacia modesta*	24.46 AB	11.98 C	0.50 B
3	*Leucacena leucocephala*	22.1 B	14.3 C	0.68 B
4	*Albizzia lebbek*	21.2 B	13.45 C	0.62 B
5	*Acacia albida*	21.8 B	13.8 C	0.68 B
6	*Acacia nilotica*	20.4 B	16.9 C	0.85 B
7	*Acacia tortilis*	23.5 AB	42.7 A	1.55 AB
8	*Cassia fistula*	20.4 B	12.6 C	0.61 B
9	*Parkinsonia aculeata*	20.63 B	15.2 C	0.75 B
10	*Bauhinia variegata*	19.9 B	38.5 B	2.19 A

The results of Duncan's New Range Test, numbers sharing different letters are statistically at $P<0.5$

It is clear from the Table that the highest shoot length was recorded for *Pongamia glabra* (42.8A) which was non significantly higher than *Acacia modesta (24.46AB)* followed by *Acacia tortilis* (23.5AB), *Leucacena leucocephala* (22.1B), *Acacia albida* (21.8B) *Albizzia lebbek*, (21.2B), *Parkinsonia aculeata*, (20.63B) *Cassiafistula (20.4B)* and least in *Acacia nilotica (20.4B)* and *Bauhinia variegate (19.9B)* All other species had non-significant differences with the descending order.

It is clear from the Table that the highest root length was recorded for *Acacia tortilis* (42.7A) which was significantly higher than the *Bauhinia variegata* (38.5B) followed by *Acacia nilotica* (16.9C), *Parkinsonia aculeata* (15.2C), *Leucacena leucocephala* (14.3C), *Acacia albida* (13.8C), *Albizzia lebbek* (13.45C), *Pongamia glabra* (13.36C), *Cassia fistula* (12.6C) and least in *Acacia modesta* (11.98C).

It is also clear from the above Table that highest root shoot ratio was recorded for *Bauhinia variegata* (2.19A) which was significantly higher than *Acacia tortilis* (1.55AB) *Acacia nilotica* (0.85B) *Parkinsonia aculeata* (0.75B) *Leucacena leucocephala* (0.68B) *Acacia albida* (0.68B) *Albizzia lebbek* (0.62B) *Cassia fistula* (0.61B) *Acacia modesta* (0.50B) and *Pongamia glabra* (0.56B).

Table 5 Effect of growth medium on root, shoot ant root shoot ratio

Medium	Root	Shoot	Root shoot ratio
Farmyard	14.3	20.4	0.73
Compost	15.1	27.1	0.75
Soil	28.4	20.5	1.2

It is clear from Table that root penetration was highest in case of soil (28.4 cm) which was significantly higher than other farmyard and compost treatments. Shoot length was highest in compost (27.1) which was significantly higher than farmyard manure and soil treatments. Differences in root shoot ratio had also marked differences with soil having value of (1.2) while compost and farmyard manure had non-significant differences.

Table 6 Effects of root shoot fresh and dry weight of species

Species	Root fresh wt.gm	Root dry wt. gm	Shoot fresh wt.gm	Shoot dry wt. gm
Pongamia glabra	0.7182 D	0.1666 D	1.7038 D	0.6096 B
Acacia modesta	0.5782 F	0.1457 E	1.0282 G	0.3235 D
Leucacena leucocephala	0.4071 G	0.1037 F	1.4360 F	0.4821 C
Albizzia lebbek	1.0471 B	0.2587 B	1.8427 B	0.6195 B
Acacia albida	0.6049 EF	0.1506 E	1.8238 BC	0.6049 B
Acacia nilotica	1.3238 A	0.3306 A	0.9838 G	0.3235 D

Acacia tortilis	0.6871 D	0.1665 D	1.8382 B	0.5986 B
Cassia fistula	0.6271 E	0.1548 DE	1.5604 E	0.5214 C
Parkinsonia aculeata	0.6382 E	0.1569 DE	1.7615 CD	0.5894 B
Bouhinia variegata	0.7993 C	0.1970 C	2.6393 A	0.8759 A

The results of Duncan's New Range Test, numbers sharing different letters are statistically at P<0.5

Fresh and dry weight of root and shoot of multipurpose tree saplings after one month of sowing is given in Table 6. It is clear from the Table that the highest root fresh weight was recorded in *Acacia nilotica* which was significantly higher than all other species. *Albizzia lebbek* was second highest in dry matter which was significantly higher than *Bauhinia variegata*; *Parkinsonia aculeata* is higher than *Cassia fistula* but different and is non-significant *Pongamia glabra, Acacia tortilis*, *Cassia fistula*, *Parkinsonia aculeata* but significantly lower than *Acacia nilotica.*

It is also clear from the Table that the highest shoot fresh weight was recorded in *Bauhinia variegata* which is significantly higher than all other species. *Albizzia lebbek* was second highest and then followed by *Acacia tortilis, Acacia albida*, *Parkinsonia aculeata, Pongamia glabra, Cassia fistula*, *Leucacena leucocephala*, *Acacia modesta* and *Acacia nilotica.*

It is clear from the above Table that the highest shoot dry weight was recorded in *Bauhinia variegata* which was significantly higher than all other species. *Albizzia lebbek* was second highest followed by *Pongamia glabra*, *Acacia albida*, *Acacia tortilis*, *Parkinsonia aculeata*, *Cassia fistula*, *Leucacena leucocephala*, *Acacia modesta* and *Acacia nilotica.*

Table 7 Effect of different growth media on fresh and dry matter of roots and shoots

Growth medium	Root fresh wt.	Root dry wt.	Shoot fresh wt.	Shoot dry wt.
Farmyard manure	0.6790 B	0.1699 B	1.6287 B	0.5492 B
Compost	1.2447 A	0.3038 A	2.6870 A	0.8934 A
Soil	0.0756 C	0.0758 C	0.6696 C	0.2249 C

The results of Duncan's New Range Test, numbers sharing different letters are statistically at P<0.5

Fresh and dry weights of root shoot in different growth media are given in Table 7. Highest fresh and dry weight of roots is observed in compost medium followed by farmyard manure and least in soil medium.

5 Discussion

Plants seeds are stored as essential genetic resources used for species biodiversity, ecological unit conservation, restoration and domestication (Berjak and Pammenter., 2004). On the other hand, there has been little study on storage behavior and seed germination of numerous plant species, particularly forest plant species. It is predicted that cheap and reliable seed storage skills could decrease forest genetic resource erosion or extinction all over the world. This analysis takes stock of the data gaps on storage behavior and seed germination of some essential plant species of commercial importance. Storage behavior, seed germination and further aspects of seed germination complications such as pulp composition, hard seed testa, phenolic compounds and hormonal imbalance.

Total area of Pakistan is 87.98 million ha, out of which merely 4.57 million ha is covered with forestry, and this shows that aggregate of 5.2 percent of land-living is in forestry cover. In this means, Pakistan is viewed as a nation having a very less forestry area of only 0.03 ha forestry per capita however the world average forestry per capita is about one ha. The part of forestry in the Gross National Product (GNP) of the nation is only 0.3%. Pakistan's Population is growing at an alarming rate of 2.6% every year which can end result further decreasing the forestry part per household. Increasing in the forestry state area is very challenging; but then there remains a good scope of raising plants on the farmland which may benefit to meet the increasing demand of fuel wood, timber and forage (Pakistan National Forest Policy, 2010). They as well trap and recycle nutrients in the soil. The trees species selected for the present study also include trees of diverse nature (Table 1). *Iple Iple, (Leucaena leucocephala),* Black Siris, *(Albezia lebbak),* White Siris, *(Albizzi aprocera),* Phulai, *(Acacia modesta),* Kikar *(Acacia nilotica), Acacia albida* and *Bakain, (Melia azadracta)* are palatable and are browsed by the livestock. Sukh Chain, *(Pongannia glabra)* is grown for its shade. Human beings and livestock take shelter. Silver Oak, *(Grevillea robusta)* is grown up for timber and fuel wood. *Amaltas, (Cassia fistula)* has medicinal value where *Parkinsonia* (*Parkinsonia aculeata*) is ornamental (Flora of Pakistan, 2007).

It has been estimated that 90% fuel wood as well as 55% timber requirements are met from plants grown on farms (Sheikh *et al.*, 2000). If in case of crop failure, plants like livestock provide alternate income to the farmer or increase their profits. The soils of Pakistan in general are deficient in fertility and especially N. The use of nitrogenous fertilizers in Pakistan is limited because of high cost, insufficient credit facilities and non-availability at appropriate time.

(Hayat *et al.*, 2008) and so, it is vital that leguminous trees are included in the harvesting systems as legumes are beneficial of enriching the nitrogen content of the soil by fixing atmospheric nitrogen. It has been stated that net profits of legumes are very high so often equal to the accumulation of 50 to 100 kg of N ha^{-1} (Phoomthiasong *et al.*, 2003). During feed scarcity period in Pakistan accessibility of green forage is the key limiting factor in livestock rearing and this lack may increase up to 75% (Bashir *et al.*, 2001). Legume forage is essential for livestock rearing because it is rich in, minerals, protein, calcium, phosphorus, and vitamins (Unkovich *et al.*, 1997).

Leguminous plants fix atmospheric nitrogen into the available from which can be taken up by the roots. The present study includes leguminous trees like *Iple Iple*, *(Leucaena leucocephala),* Black Siris, *(Albezia lebbak),* White Siris, *(Albizzi aprocera),* Phulai, *(Acacia modesta),* Kikar *(Acacia nioltica),* and sufaid kikar, (*Acacia albida).* These leguminous trees are known for their capacity to fix atmospheric nitrogen (N" goran *et al.*, 2002). Forage tree leaves are alternate feed source for ruminants and can support (Malik *et al.*, 1967) to reduce the wide-ranging gap among accessibility and source of nutrients, and increase the animal growth and productivity. Forage plant leaves are extremely rich in soluble carbohydrates, protein, vitamins, and minerals are used as fodder (Bakshi and Wadhwa, 2007). Usage of plant leaves in ruminants improves microbial growth and digestion (Bonsi *et al.*, 1995). Also, fodder plant leaves are very much be partial to small ruminants particularly goats and camel. Many scientists have acknowledged from an elongated period that *Iple Iple* (*Leucaena leucocephala*) played a dynamic role in the development of cattle production. Many researches working at University of Hawaii in 1930s, (Henke, 1933; Henke *et al.,* 1940) showed the significance of *Leucaena* to dairy and beef cattle. Another research has revealed that improved breed of cattle can increase 1 kg weight each day if provided with 100% of *Leucaena*, rich in protein for at least three months before slaughtering. The trials were done by Commonwealth Scientific and Industrial Research Organization (CSIRO) in Australia. *Leucaena* has 30 to 32% protein in the leaves on dry weight base. Without any disease or bad effect, livestock can consume *Leucaena* up to 4 months, which is a picture-perfect time for fattening of livestock before slaughtering (Hutton *et al.*, 1974). As per *Leucaena* contains a harmful compound called mimosine, which create thyroid complications and some other harmful effects when fed to livestock for an extended time period, this harmful effect can be reduced by the addition of grass (Brew baker *et al.*,1976).

In Asia, Africa and the Pacific islands leguminous plant leaves has mostly been given as to domestic animals. *Leucaena leucocephala* (*Leucaena*) species are planted alongside with grazing land in fodder pools and source to very nutritious fodder for ruminants. Legume plant leaves comprise of greater protein and mineral as compare with grasslands that reduce quickly in quality with improvement to ripeness. These plants are used as a good worth fodder for feeding animals these days to improve the production (Clem *et al.*, 1993). There are numerous techniques through which plants can give an improvement in the nutrient supply, for example improving nutrient recycling, maximizing the nutrient input to the soil, reducing nutrient losses from the soil while provided that extra environmental benefits. Integration of the nitrogen-fixing leguminous plant can store 100 to 200 kg N ha^{-1}within two years in sub moist tropical areas of East and Southern Africa. These totals of nitrogen therefore fixed from atmosphere are nearly the same to those applied as manures by farmers to the maize yield (Sanchez *et al.*, 2002).

Without much of extra efforts and expenditures another significant benefit of plants on agricultural land is increase in farm profit (Khan *et al.*, 1989). Farmland plantation is similar to fixed deposit accessible in the rainy days or by the time of requirement otherwise failure of yields due to natural catastrophes. The unpredicted expenses such as wedding ceremony, funeral or loss through economy recessions which is met from the profit of farmland plants (Pakistan National Conservation Strategy 1990). Plants on farmland improve the microclimate and it is not infrequent to feel the cooling effect of the plants on a warm summer day. Plants so protect us, our houses and animals from blazing sun in summer and cold winds in wintertime. The parameters of production from specific soils are affected by management practices and quality (Baig *et al.*, 2008). Therefore the activities are basic to promote of the optimal land usage are: valuation of degradation hazards, land resources inventories, development of soil fertility, assessment of production capacity, land reclamation combating desertification and integrated land use planning. The potential support of plants to soil enhancement is one of the main resources of agro forestry is wide-ranging (Sanchez *et al.*, 1997). The improvement of soil productiveness through plants is obvious in researches which relate production of crops developed on soils made under tree coverings and on control soils in open places (Craig and Wilkinson, 2004). Soil fertility differences as revealed by means of *in situ* crop efficiency differ at variable spaces from the plant. In general, greater soil nutrient position in plant cover is revealed in the mineral content of under storey herbaceous species (Tonye *et al.*, 1997). Due to the pressure on the land soil infertility is continuous cycle of crop growing without allowing it to rest. It, therefore, should be taken in that in order to make sure the optimal land use, it is essential that a nation's land capitals should be evaluated in terms of suitability at different stages of inputs for different sorts of land use such as agriculture, grazing and forestry.

In several developed and developing nations, this integrated land usage has been given the terms of agro forestry, agro silvo pastoral activity etc. where plants are being grown-up in aggregation with agricultural crops and where big herds of livestock are being raised up under agro silvo pastoral method of land use. The most important processes held responsible for the formation of great fertility around plants share to improved biological processes related with the seasonal and extended period return of nutrients accumulated in plants to the soil over litter fall, exudation and root decay and their mineralization, as well as leaching of nutrients kept in canopies. According to tree size, soil texture at times differs. Reasons behind these changes associated to plant size are not clearly understood (Sangha *et al.*, 2005). Increases in organic matter and better microclimatic conditions plants improve soil microbial enzymatic activity, physical characteristics and decomposition (Tian *et al.*, 2001). When this is related to open places, biological activity is two to three times more. Some soil lost through wind erosion may well be intercepted by plants and deposited through fall and stem flow. Plants also increase soil nitrogen accessibility due to Nitrogen fixation (N"goran *et al.*, 2002). Improved fertility under plants may also be due to bird manures and this is incorporated in livestock, dung deposition by wildlife which rest in plant shade. The plant benefits may be more pronounced where livestock is excluded than in ordinary agro silvo pastoral methods (Anon *et al.*, 2000).

In the mitigation and adaptation to atmospheric greenhouse gases, trees play a vital role (IPCC. 2000). In comparison to all other kinds, agro forestry has been considered to have the maximum potential for carbon sequestration as the system offers the chances of synergies among both adaptation and mitigation. The amount of carbon existing in the aboveground and belowground biomass of an agro forestry method is far better than that in an equal land-use system without plants and vegetation. It has been assessed that in Southeast Asia, agro forestry methods have the ability to store 12-228 Mg C ha^{-1} in moist tropical lands and 68-81 Mg C ha^{-1} in arid lands (Murthy *et al.,* 2013).

Seed germination is termed as the appearance of the embryo from the seed (Bewley and Black 1983). Some plant seeds have inherent seed dormancy well-known as main seed dormancy, which is generally caused by maternal tissues. For instance, this might be due to embryo immaturity at harvest, inhibition of water uptake, restriction of embryo expansion and the lack of leaching of inhibitors (Hilhorst *et al.*, 2006). In this case, such seeds do not grow despite occurrence of favorable development conditions. *Parinari curatelli folia* seeds are related with immature embryo, and therefore the seeds need after-ripening procedure to take place before they are effectively germinated. In this case, seed storage is necessary to allow the after-ripening procedure to occur. According to (Amen *et al.*, 1968), the balance among growth promoters and inhibitors may play an important role in regulatory embryo maturation, and therefore the seeds are dormant at harvest. With improvement in storage period, the hormonal stability shift in favor of the growth promoters, and later the major seed dormancy is then broken to allow the seeds to grow.

Seed size difference has much significance in ecological implications. It can affect seed growth. Seedling establishing differs by seed size. Big size seeds have a tendency to create seedlings that are more probable to survive to development than seedlings from minor seeds, and yet not always. Seedling appearance (Berdahl and Barker., 1984) and seedling establishing differs with seed size. Germination rate is also affected as large seeds grow more rapidly than the small ones (Marshall *et al.*, 1986). Competitive capacity of a tree rest upon the quantity of food kept in their seeds. Seeds having great quantity of food have higher competitive capacity than those seeds which have a smaller amount of food contents .Large seeds have a tendency to create seedlings that are more possibly to survive to development than the saplings made from the minor seeds, however it does not always occur (Wulff *et al.*, 1986). While dormancy breaking the treatments was given, growth percentage was enhanced significantly. Amongst dormancy breaking treatments, nicking provide the highest germination, though hot water provide the lowermost growth percentage suggesting the seeds could not tolerate the shockwave of high temperature which reduced germinating ability of the seed. This outcome is reliable with the research made by (Bhardwaj *et al.,* 2003). The comparison of early germination with viability challenging showed that seeds were dormant ones. Due to hard seed coat and slow imbibition *Albizzia lebbek* show the poor germination

(Khan and Tripathy., 1987) and presence of a micro pylar plug (Dell *et al.*, 1980). In this research, acid scarification treatment for 15 minutes and soaking in warm water for 3 hrs were found tremendous for enhancing germination percentage. Exogenous dormancy is removed by acid. Hard seed coat is the foremost hindrance in enhancing growth of *Albizzia* species (Sur *et al.*, 1987). The results of this research were also in harmony with the results of these writers. Since warm water treatment associated to acid scarification is cool to apply and inexpensive, it is suggested for increasing growth in this species. Amongst the dormancy breaking treatments, the acid scarification intended for 30 minutes and nicking were the greatest ones to take out no single the hard seed coat but as well micro pylar plug. These treatments were found appropriate for breaking physical dormancy of the seeds of this species. This end result is reliable with the results of the research conducted by (Bahorun *et al.,* 2005). Also, warm water treatment as well damaging to seed sustainability of this species and these adverse effects were related to interval of soaking. In this research, highest growth was found from the seeds of *Dalbergia sissoo* when soaked in tap water for 2 hours. Results recommended that more growth of this species may be achieved without any of seed treatment. While treatments were applied for softening the seed coat, important enhancement in germination was observed. This recommended that retarded growth was due to physical dormancy, which slows the penetration of water to inside the seed. Rigid seed coat was accountable for absence of oxygen, water and other nutrients to the embryo. Al though, when dormancy breaking treatments of warm water, nicking and acid scarification for different time intervals were applied.

Slow growth and low survival ratio of multipurpose plants and vegetation as an end result of bad quality plant seedlings hamper determinations through insignificant scale farmers in improvement of effective agro forestry methods. These can be attributed to the physical and chemical properties of the soil developing medium used. With the recent high and developing demand for excellence agro forestry plants and vegetation, farmers are progressively raising planting stock on their farms. However, inadequate technical knowledge has every so often hindered success. Such growth media contribute to chemical and physical conditions that may be unsuitable for quality seedling growth. Survival rate and slow growth lead to extra charges in replacement planting as well as hindered benefits. Growing media compost gave higher seed germination percentage as related to silt and farm media. Compost contain growing media also provided higher height growth and seedlings survival rate than sand and farm soil. It also provided seedlings with higher sturdiness quotient. The chemical and physical properties of on-farm plant nursery growing media that had the highest effect on *Tamarindusindica* seedling quality were the total pore volume aeration, pore volume, total nitrogen, wet bulk density, organic carbon, calcium and magnesium. Influence of small-scale farmers' plant nursery growing media on agro forestry tree seedlings' quality in Mt. Kenya region is also in line with where maximum seed germination was obtained in compost medium (Kungu *et al.*, 2008).

Conclusion and Recommendations

Conclusion

It is concluded from the study that the maximum germination percentage in farmyard manure was found. Highest growth of roots and shoots was observed in compost medium. Soil medium had the lowest seed germination and growth as it had the lowest nutrients so there is need to increase forest cover of the country on farm land. The demand for forest products is increasing day by day and area under forest is shrinking. The fertility of the soil is decreasing due to intensive cropping so there is need to increase to grow leguminous trees there is need to improve the germination of seeds so that more and more useful trees are grown on the farms in agro forestry practices.

Recommendations

1. Research on tree crop interaction studies may be enhanced to meet the need of forest products.
2. Germination of multipurpose tree seeds may be enhanced.
3. Chemical and mechanical methods of tree seeds production enhancement may be explored.
4. Research on acid treatment may be conducted to soften hard core of seeds.

REFERENCES

Abubakar Z., Muhammad.A.(2013). Breaking Seed Dormancy in Tamarind (*TamarindusIndica*) a case study of Gombe local government area. J. Appl. Sci. Environ. Manage, 17(1), 83-87.

Adam. B., Puteh, Ellia M. Aris. Uma R. Sinniah, Md. M. Rahman1.,Rosli B. Mohamad and Nur. A. P. Abdullah. (2011). Seed anatomy, moisture content and scarification influence on imbibition in wild banana (*Musa acuminata*Colla) ecotypes. African Journal of Biotechnology ,10(65), pp. 14373-14379.

Ahmad.R.Z.,Shaheen.M.N.K., Afzal.J., Siddique.S., Qamar.I.A., Ahmed.J. (2015). Improvement of seed germination in some important multi-purpose leguminous trees of Islamabad Area.An experimental study. Basic Research Journal of Agricultural Science and Review, 4(7) pp. 217-224.

Algunaid F.H., Ibrahim.A.M.,Zahran,B.B.,(2013). *Khayasenegalensis* seeds polymorphism and dormancy breaking seeds collected from different localities in Sudan. International Journal of Scientific and Research Publications, Volume 3, Issue 2.

Amen R.D., (1968). A model of seed dormancy. Botanical Reviews, 34, 1-31.

Arora., D. S. and Kaur.J., (1999).Antimicrobial activity of spices. Int. J. Antimicrob. Agents, 12: 257-62.

B. Washa., (2015). Potential of the Dark as a Factor affecting Seed Germination.International Journal of Science and Technology, Volume 5 No.2.

Babeley. G. S., Gautam, S. P. and Kandya. A.K., (1986). Pre-treatment of *Albizialebeck* (Benth.) seeds to obtain better germination and vigour. Journal of Tropical Forestry, 2 (105) - 113.

Baig M.B., A.Shabbir and K. Nowshad.(2008). Germplasm conservation of multipurpose trees and their role in agroforestry for sustainable agricultural production in Pakistan.Int. J. Agric. Biol, 10 (2).

Bakshi, M.P.S. and Wadhwa, M. (2007). Tree leaves as complete feed for goat kids. Small Rumen Res., (69)74-78.

Baskin, C.B. and J. Baskin.(1998). Ecologically Meaningful Germination Studies. In Seeds: Ecology, Biogeography, and Evolution of Dormancy and Germination. Academic Press, 5-26.

Berdahl, J.D., and R.E. Barker (1984).Selection for improved seedling vigor in Russian wild rye grass. Can. J. Plant Sci, (64) 131–138.

Bewley J.D., Black. M., (1983). Physiological and Biochemistry of Seeds in Relation to Germination Development, Germination, and Growth, Springer-Verlag, Berlin, Germany, 306 pp.

Bewley, J.D., Black, M., (1994).Seeds Physiology of Development and Germination. Plenum Press, London, p. 445.

Bharath, M., Tulasi, E.L., Sudhakar, K. and Eswaraiah, M., (2013). Dalbergia sissoo an important medicinal plant. Int. J. of Res. in Pharmacy and Chemistry, 3(2), pp.384-388.

Bonsi, M.L.K. Osuji P.O., andThuah, A.K. (1995). Effect of supplementing tef straw with different level of Leucaena or Sasbania on the degradability of tef straw, sesbania, leucaena, tagaste and vernonia and certain rumen and blood metabolities in ethopianmenz sheep. Anim. Feed Sci. Technol, (52) 101-129.

Brew baker, J. L., (1976). The Woody Legume, Leucaena Promising Source of Feed, Fertilizer, and Fuel in the Tropics. Acapulco, Mexico, Sponsored by Banco de Mexico.

Clem, R.L.C.R Esdale, M.J. Conway and Macintyre, D. (1993). Beef production from commercial Leucaena leucocephala pastures in a dry subtropical environment. Proceedings of XVII International Grasslands Congress.

Coder, KD, (1996).Identified Benefits of Community Trees and Forests, University of Georgia Cooperative Extension Service - Forest Resources Publication, FOR 96-39.

Cota Sánchez, J.H., Abreu. D.D., (2007).Vivipary and offspring survival in the epiphytic cactus Epiphyllumphyllanthus (Cactaceae).Journal of Experimental Botany, (58)3865–3873.

Craig.E., and K.Wilkinson., (2004). Nitrogen Fixing Trees-A Brief Introduction. The over story is distributed by Agroforestry Net, Inc., P. O. Box 428, Holualoa, Hawaii 96725 USA.

Dell, B. (1980). Structure and function of the strophiolar plug in seeds of Albizialophantha. American Journal of Botany, (4)556 - 563.

Drake, D.R. (1993). Germination requirements of Metrosiderospolymorpha the dominant tree of Hawaiian lava flow and rainforests.Biotropica, (25) 461–467.

Dwyer, JF, McPherson,EG, Schroeder, HW and Rowntree, R., (1992).Assessing the Benefits and Costs of the Urban Forest, [in] Journal of Arboriculture 18(5), pp 227 - 234.

El-Adawy, T. A.(2002). Nutritional composition and anti nutritional factors of chickpeas (*Cicerarietinum* L.) undergoing different cooking methods and germination. Plant Foods for Human Nutrition, (57), 83–97.

REFERENCES

El-Azazi, El-Sayed, Sourour, M. M., Belal, A. H., Khalifa, E. A. (2013). Improving *Acacia tortilis* Seeds Germination By Breaking Dormancy Treatments. I.J.A.B.R., 3(1) 103-109.

Eliud.R, Reuben.M.,Linnet.G.(2009). Longevity of Bean (*Phaseolus vulgaris*) Seeds Stored at Locations Varying in Temperature and Relative Humidity. Journal of Agriculture, Pure and Applied Science and Technology. 20 73-87.

F.A. Bughio, S.M. Mangrio, S.A. Abro, T.M. Jahangir and HadiBux (2013) Physio-Morphological Responses of Native Acacia Nilotica to Eucalyptus Allelopathy. Pak. J. Bot., 45(S1) 97-105.

Fenner, M., Thompson, K., (2005).The Ecology of Seeds. Cambridge University Press, Cambridge.

Flora of Pakistan (2007). University of Karachi., Pakistan.

Flores, J., Jurado, E., Arredondo, A., (2006). Effect of light on germination of seeds of Cactaceae from the Chihuahuan Desert, Mexico. Seed Science Research, 16, 149–155.

Fredrick.C.,Muthuri.C and Ngamau.K., Fergus Sinclair.(2016). Provenance and pretreatment effect on seed germination of six provenances of *Faidherbiaalbida* (Delile) A. Chev. Agroforest System, 10 1007/s10457-016-9974-3

Gere.J, Karidzangundi.R.,Ntuli.V, Nyamugure.T,Mudyiwa.S.M and Kundhlande.,A.(2015). Filing considerably breaks seed dormancy of *Berchemiadiscolour*Hemsley.African Journal of Plant Science, 9 (6), pp.247-278

Hartman, H.T.; Kester, D.E.; Davies, F.T.; Geneve, R.L., (1997). Plant propagation: principles and practices. 5th ed. Upper Saddle River, NJ: Prentice Hall Press.

Henke, L.A., (1933). Value of Koa Haole (*Leucaenaleucocephala*) as a feed for dairy cows. Progress Note 1.Hawaii Agricultural Experiment Station, Honolulu, Hawaii.

Hilhorst H.W.M., Bentsink L., Koorneef .M., (2006). Dormancy and germination. In: Basra AS (Ed) Handbook of Seed Science and Technology. The Haworth Press, NY, USA, pp 271-302.

Hutton, E. M. (1974). Tropical Pastures and Beef Production. Reprint from World Animal Review. No.12. FAO,United Nations. Rome.

IPCC (2000) IPCC Special Report on Land Use, Land Use Change and Forestry. Summary for Policy Makers. Geneva, Switzerland.

Johnsen F. H. 1999. Burning with enthusiasm: fuelwood scarcity in Tanzania in terms of severity, impacts and remedies, Forum for Development Studies, 1, pp. 107-131

K. Espahbodi, S. M. Hosseini, H. Mirzaie–Nodoushan, M. Tabari, M. Akbarinia, Y. Dehghan-Shooraki., (2007). Tree Age Effects on Seed Germination.In SorbusTorminalis. Gen. Appl. Plant Physiology, 33 (1-2), 107-119.

Khan, M.L and Tripathi, R.S. (1987). Ecology of forest trees of Meghalaya. Seed germination and survival and growth of Albizialebbeck seedlings in nature. Indian Journal of Forestry, (10) 38-43.

Khan, M.M., (1989). Economic analysis of agroforestry options for small irrigated farms in Punjab. Professional paper in partial fulfillment of the requirements for the Degree of Master of Science. Colorado State University fort Collins, Colorado.

Khanum., R., A. S. Mumtaz and S. Kumar. (2013). Predicting impacts of climate change on medicinal asclepiads of Pakistan using Maxent modeling. ActaOecologica, (49) 23-31.

Khattak, A. B., Zeb, A., Bibi, N., Khalil, S. A., & Khattak, M. S. (2007). Influence of germination techniques on phytic acid and polyphenols contents of chickpea (*Cicerarietinum* L.) sprouts. Food Chemistry, (104) 1074–1079.

Koger.H.C., Reddy.K.N.,Poston.D.H.(2004). Factors affecting seed germination, seedling emergence,and survival of texasweed (*Caperoniapalustris*) Weed Science, (52) 989–995.

Kung.B.J, Kihara.JMugendi.D.N andJaenicke.H (2008). Effect of small-scale farmers' tree nursery growing medium on agroforestry tree seedlings' quality in Mt. Kenya region. Scientific Research and Essay, 3 (8), pp. 359-364.

M.A. Khan, R.A. Qureshi, S.A. Gillani, M.A. Ghufran, A. Batool and K.N. Sultana (2010).Invasive Species of Federal Capital Area Islamabad, Pakistan.Pak. J. Bot., 42 (3).

M.Kabir and M. Z. Iqbal., (2011).Effects of Different Soils on Seedling Growth of Cassia Fistula L.Under Natural Field Conditions. FUUAST J. BIOL., 1(2) 115-122.

Ma.H., C. Shi, Q. Han and B. Wen. 2013. Fixed point rubbing fault characteristic analysis of a rotor system based on contact theory. Mechanical Systems and Signal Processing, (38) 137–153.

Malik, M.Y. A.A. Sheikh and Shah, W.H (1967) Chemical composition of indigenous fodder tree leave. Pak. J. Sci, (19) 5-7.

Marshall, D.L. (1986). Effects of seed size on seedling success in three species of Sesbania (Fabaceae). American Journal of Botany, (73) 457–464.

Munn, R.E. and Fedorov.V, (1986).The Environmental Assessment, IIASA Project Report, International Institute for Applied Systems Analysis, Laxenburg, Austria.s analysis of pre-harvest sprouting resistance in white wheat. Field Crops Research, (91) 63–69.

Murthy, I.K., M. Gupta, S. Tomar, M. Munsi, R. Tiwari,G.T., Hegde and N.H. Ravindranath. (2013). Carbon sequestration potential of agroforestry systems in India. Journal of Earth Science & Climate Change, 4(1) 1-7.

N"Goran A., G.M., Gnahoua, K. Oualou, and P. Balle. (2002). Evolution of maize yield after tree fallow in a humid forest zone of Cote d"Ivoire, Cahiers d"Etudeset de RecherchesFrancophones/ Agricultures France). (11) 145-149.

Nasir.S,WaseemAkram.W., and FarooqAhmed.F (2012). The Population Dynamics.Ecological and Seasonal Activity of *Paederusfuscipes* Curtis (Staphylinidae; Coleoptera) in the Punjab, Pakistan. APCBEE Procedia, (4) 36 – 41.

Ovono., P. O., C. Kevers and J. Dommes. 2010. Effects of storage conditions on sprouting of microtubers of yam (*Dioscorea cayenensis*–D. rotundata complex). C. R. Biologies. (333) 28–34.

Pakistan National Conservation Strategy (1990).Ministry of Food, Agriculture and Livestock, Government of Pakistan, Islamabad.

Pakistan National Forest Policy (2010) Ministry of Climate Change, Government of Pakistan, Islamabad.

Palin, D.J., (1984). Institutional arrangements for forestation.In:N.P. Wiersum (Editor), Strategies and Designs for Afforestation, Reforestation, and Tree Planting, Proceedings of international symposium on the occasion of 100 years of forestry education and research in the Netherlands, Wageningen. Pudoc, Wageningen, pp. 312-330.

Pallavi, H. M., Vishwanath, K., Harish, B. S., Prashanth, Y. and ManjunathThattimani (2014).Seed treatments to break seed dormancy and Standardization of viability test procedure in Abrusprecatorious. Journal of Medicinal Plant Research, 8(4), pp. 229-236.

Paul E. Loth, Willem F. de Boer, Ignas M. A. Heitk¨onig and Herbert H. T. Prins (2005). Germination strategy of the East African savanna tree Acacia tortilis. Journal of Tropical Ecology, (21) 509–517.

Phoonthiasong, J., B. Toomsan, V. Limpinuntana, G. Cadisch and I. Payanothai (2003).Attributes affecting residual N-fixing mungbean and groundnut cultivars. Biol. Fert. Soil, 39(1) 16-24.

R. Cochard., M.E.U.I. Dar (2014) Mountain farmers' livelihoods and perceptions of forest resource degradation at Machiara National Park, Pakistan-administered Kashmir. Environmental Development 10, 84–103

Radosevich, S.R., J.S. Holt, and C.M. Ghersa(1996) Weed ecology implications for management. 2nd ed. John Wiley, New York, USA.

Rajendran,K and Mohan,E.(2015) A survey of multipurpose tree species in the forest nurseries of southern tamilnadu. g.j.b.b., vol.4 (1) 2015: 69-73.

Ramírez-padilla, C.A., Valverde, T., 2005.Germination responses of three congeneric cactusspecies (Neobuxbaumia) with differing degrees of rarity. Journal of Arid Environments61, 333–343.

Razzaq, A., N.I. Hashmi, B.M. Khan and P.R. Hobbs, 1990. Wheat in Barani Areas of Northern Punjab: PARC/CIMMYT Paper. Coordinated Wheat Progmamme, PARC, Islamabad, Pakistan

Rehman.S.A and Iqbal.M.I (2007).Growth Of Leucaena Leucocephala (Lam.) De-Wit, In Different Soils of Korangi and Landhi Industrial Areas of Karachi, Pakistan. Pak. J. Bot., 39(5): 1701-1715.

Rios, J.L. and Recio, M.C. (2005) J. Ethnopharmacol, 100:80-84.

Rojas-Aréchiga, M., Orozco-Segovia, A., Vázquez-Yanes, C., 1997.Effect of light on germination of seven species of cacti from the ZapotitlánValleyin Puebla, México. J.AridEnviron.36,571–578.

Rojas-Aréchiga, M., Vázquez-Yanes, C., Orosco-Segovia, A., 1998. Seed response to temperature of Mexican cacti species from two life forms: an eco physiological interpretation. Plant Ecology 135, 207–214.

S. Gill; A. Al-Shankiti (2015) Riming Of Prosopis Cineraria (L.) Druce And Acacia Tortilis (Forssk) Seeds With Fulvic Acid Extracted From Compost To Improve Germination And Seedling Vigor. International Center ForBiosaline Agriculture (ICBA), Dubai, P.O. Box 14660, United Arab Emirates.

Sanchez PA, Buresh RJ, Leaky RRB (1997). Trees, soils and food security, Phil. Trans. R. Soc. London, Ser. B 353 (1997), pp. 949–961.

Sanchez, P.A. 2002. Soil fertility and hunger in Africa. Science. 295:2019–2020.

Sheikh M.I. A.S. Bukhari and A.Q.Khan (2000) Baseline survey of three irrigated plantations vizChanga Manga, LalSohanra and Kundian. Pp.152 Pb.For Sector Dev. Project.

Simão, E., Socolowski, F., Takaki, M., 2007. The epiphytic CactaceaeHylocereussetaceus(Salm-Dick ex DC.) Ralf Bauer seed germination is controlled by light and temperature.Brazilian Archives of Biology and Technology 50, 655–662.

Supple, K.R., A. Razzaq, I. Saeed and A.D. Sheikh, 1988.Barani Farming System of the Punjab- Constraints and Opportunities for Increasing Productivity.Agriculture Econ.Research Unit, NARC, Islamabad, Pakistan.

Sur, K., Lahiri, A. K. and Basu, R. N (1987) Improvement of germinability of some forest tree seeds by acid scarification and hydration dehydration treatments. Indian Agriculturist 31: 115-122.

Tonye.J B.Ibewiro and B.Duguma. 1997. Residue management of a planted fallow on an acid soil in Cameroon: crop yields and organic matter fractions, Agrofor. Sys.37: 199–207.

Unkovich,M.J. J.S. Pate and P.Sanford (1997) Nitrogen fixation in Australian Mediterranean Agriculture. Austral. J. Agric. Res. 48: 267-293.

Valverde, T., Quijas, S., López-Villavicencio, M., Castillo, S., 2004. Population dynamics of Mammillariamagnimamma Haworth (Cactaceae) in a lava-field in Central Mexico.Plant Ecology 170, 167–184.

Vozzo, J.A., ed. 2002. The tropical tree seed manual.U.S. Department of Agriculture, Forest Service. Washington, DC: U.S. Government.

Wulff, R.D (1986) Seed size variation in Desmodiumpaniculatum. II. Effects on seedling growth and Interaction effects of seed mass and temperature physiological performance. Journal of Ecology 74: 99–114.

Yazdi, S.A.F., Rezvani.M.,Rashed.M.H., Mohassel and Ghanizadeh.H(2013). Factors Affecting Seed Germination And Seedling Emergence Of Sheep Sorrel (*RumexAcetosella*) Romanian Agricultural Research NO. 30, Print ISSN 1222-4227

Zereen.A and khan.Z (2012) A survey of ethnobotanically important trees of Central Punjab, Pakistan. BIOLOGIA (PAKISTAN), 58 (1&2), 21-30