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Comparative Study on Variation of Plus Trees collected from Five Forest Reserves in Let Pan Khon

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ကျွန်းမျိုးသန့်ဝင်ဥယျာဉ်အတွင်းရှိ မူရင်းဒေသ (၅) ခုမှ ရွေးချယ်စိုက်ပျိုး ထားသည့်ဝင်
ကျွန်းမျိုးကောင်းမျိုးသန့်ဝင်ပင်များ၏ မျိုးရိုးဗီဇကွဲပြားခြားနား မှုကို လေ့လာခြင်း

ခင်ပပရွှေ၊ သုတေသနလက်ထောက်-၂
အုန်းလွင်၊ ပါမောက္ခ
တင်တင်မူ၊ လက်ထောက်သုတေသနအရာရှိ

စာတမ်းအကျဉ်း

ဤသုတေသနလုပ်ငန်းသည် မျိုးသန့်သစ်စေ့ထုတ်ဥယျာဉ်၊ သုတေသနစခန်း အမှတ်(၇)၊ လက်ပံခုန်တွင် မူရင်းဒေသအလိုက် စိုက်ပျိုးထားသည့် ကျွန်းပင်များ၏ ရှင်သန်ကြီးထွားနေမှုအခြေအနေများကို စာရင်းအင်းနည်းပညာဖြင့် ဆန်းစစ်လေ့လာ၍ နှိုင်းယှဉ်ဖော်ပြထားခြင်းဖြစ်ပါသည်။

Comparative Study on Variation of Plus Trees collected from Five Reserves Forest in Let Pan Khon

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Abstract

In this study, the growth performance of teak plus tree from five forest reserves was investigated by statistical analysis in seed orchard at Research Station No. (7), Let pan khon (Comparative Study between Provenances).

CONTENT

Comparative Study on Variation of Plus Trees collected from Five Reserves Forest in Let Pan Khon

1. Introduction

Teak seed orchard at Let pan khon village in Oak-Twin Township was firstly established in early 1980s order to fulfill the needs of long-term plantation programmed under East Bago Yoma Project EPP. Altogether 33 plus trees with outstanding morphological characteristics were carefully selected from five forest reserves. And their vegetative parts and seeds were collected and planted as seed orchards in addition to the purpose of *ex situ* conservation or teak germplasm collection of Bago Yoma. For the time being, it has been generating by Forest Research Institute for further development of regular research activities since 1992. Even though it became into old enough at about 33 years, there was no apparent result came out yet.

In this day and age, good quality teak has boosted in depletion of natural teak forest and its associated resources. In this context, man-made forest becomes an essential solution to produce wood sustainably and pressure off natural forests. In realistic assumption, successful implementation of plantation is merely based on planting material. In contrast, planting materials need not only be of adequate supply but also to be high quality.

In terms of wood volume, seed collected from managed seed orchard, without doubt, grants than those from unknown sources or even more seed production area. On the other hand, it is needed to find out the best fit teak trees among all selected plus tree with the aim of providing good planting stock to plantation programmed in Bago Yoma area. Therefore, selection of good seed from seed orchard and variation of their growth performances are needed to study for the development of plantation forestry in Myanmar.

1. Objectives

The main objectives of this study were:

(a) To compare the growth performance from various seed sources by colonel variation and

(b) To select the suitable provenances of seed sources for plantation sites in let pan khon region.

3. Literature Review

3.1. Distribution of Teak

In Myanmar, natural teak was found in the three main types of forest such as semi-evergreen forest, mixed deciduous forest and *Indaing* or deciduous *dipterocarp* forests. The growth and quality of teak are associated with deep, flat, and well drained-alluvial soils, rich in calcium, mean annual temperature ranging from 22˚ - 27˚C and an annual precipitation from 1500 to 5000 mm. Thus a number of different habitat populations can be distinguished

both on morphological characteristics and adaptability (Kermode, 1964 as cited by Gyi and Tint, 1998).

3.2. Provenance Variation

Wright (1976) stated that "Provenance" is a synonym for "origin" or "source" and "ultimate natural origin". A "provenance test" is an experiment in which seeds are collected from a number of widely scattered stands (usually natural), and the seedlings are grown under similar conditions. Provenance testing is also done for very practical reasons, to screen the naturally available genetic variation and to choose the best available types for reforestation or further breeding work. Practical use of provenance data can be applied in planning breeding work, generalized planting recommendations, recommendations for seed from specific stands, and provenance tests as seed orchards.

Several board studies have examined geographic variation in teak and the existence of such variation within the species is still established (Berd 1943, Mathanda 1951, Keiding *et al*, 1964, Cameron 1966, Gale (2) and Naing 1967, Hedegart 1971 and 1974, Gyi 1972 as cited by Gyi *et al*., 1984). Provenance differences for teak as well as many species have been investigated in as international network of provenance trials and these trials reveal important genetic variation between provenances tested at locations within and outside the natural distribution area (Kjaer *et al.*, 1995, Kaosa-ard *et al*., 1997).

3.3. Growth Performance, Morphological and Adaptive Characteristics

Provenance variations in wood quality, growth rate, stem form, seed morphology and germination, early and abundant flowering and other characters of teak were reported (Hedegart, 1974; Keiding *et al*., 1986). A series of international teak provenance trials (75 provenances and 48 field trials) established in the early 1970s clearly demonstrated effects of provenances or seed source on growth, stem quality, wood density and health of this species.

Harahap and Soerinegara, (1977); Keiding *et al.*, (1986) and Kaosa-ard, (1998) reported that heritability values of certain characters at provenance level have been estimated to understand teak genetic parameters. Among the observed characters such as diameter growth, stem straightness and clear bole, it was found out that persistence of stem axis and flowering habit (early and/or late flowering) were strongly inherited (i.e. $h^2 = 0.70$) in this species.

Teak trees are genetically diverse organisms and better growth, quality and adaptability of teak can therefore be achieved by carefully selecting the best sources when raising seedling for a given planting site (Kjaer *et al*., 2000). Kjaer *et al*., (2000); Finkeldey and Hattemer, (2007) reported that seed source (provenance) testing and use of best seed sources is one of the important activities and starting point in the initial phase of most domestication programs, and leading to a tree improvement program The wide geographic range and extensive cultivation of the species offer great potential for the selection of genetic material for tree improvement program (Pinyopusarerk and Williams, 2000).

Considering the importance of provenance test in plantation program and being lack of much information in teak genetic variation in Myanmar, a future study on teak provenance is undoubtedly necessary to implement for teak as well as for other commercial species.

4. Materials and Methods

4.1. Experimental site

The experiments were carried out at Let Pan Khon Research Station, Oak Twin, Bago from 2009 to 2010.

4.2. Plant materials

Clones of Block B from five forest reserves (P1, P2, P3, P4, P5) were used as experimental materials.

4.3. Data Collection

The following data were collected:

- No. of inflorescence
- No. of seed
- Leaf size
- Pest (%)
- Leaf shed
- Leaf flush
- Crown diameter
- Height
- Crown height
- GBH
- Stem form
- Stem position and form
- > No. of 4'6" fork
- < No. of 4'6" fork
- > No. of 3" branch

4.4 Experimental design

The experiment was laid out in Complete Randomized Block Design (CRBD) in each treatment. It has three treatments and five replications.

4.5 Statistical Analysis

Collected data has been processed and accumulated by using Microsoft Office Excel 2003.The recorded data has been statistically analyzed by using statistical software. Analysis of Variance (ANOVA) was done by using Statistix 8.0.

5. Results and Discussions

Based on the results of each provenance, the effects of colonel variation were revealed on no. of inflorescence and no. of seed. P3 was found as the best among others and P2 was

observed as the poorest for no. of inflorescence. CV% (coefficient of variation) of no. of inflorescence was 63.48. P5 was found the best performance but P4 was the poorest for no. of seed. CV% of no. of seed was 66.98 (Figure 1)

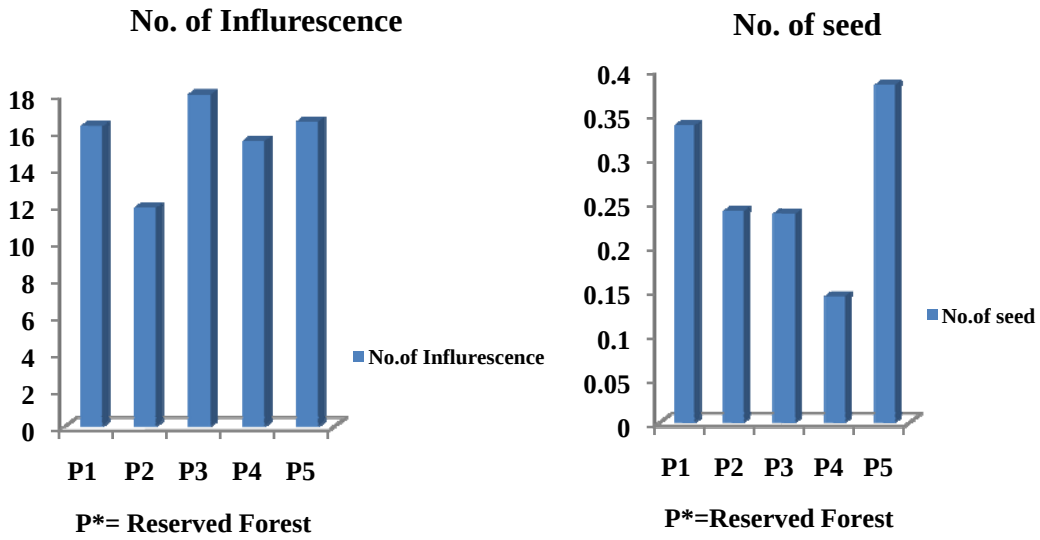


Figure 1. Effect of colonel variation on no. of inflorescence and no. seed from provenances.

The effects of colonel variation were also described on pest % and leaf shed (Figure 2). P4 was found the best performance but P1 was the poorest for Pest %. CV% was 42.10. P5 was found the best performance for the leaf shed. However, P1 was the poorest. CV% was 19.43.

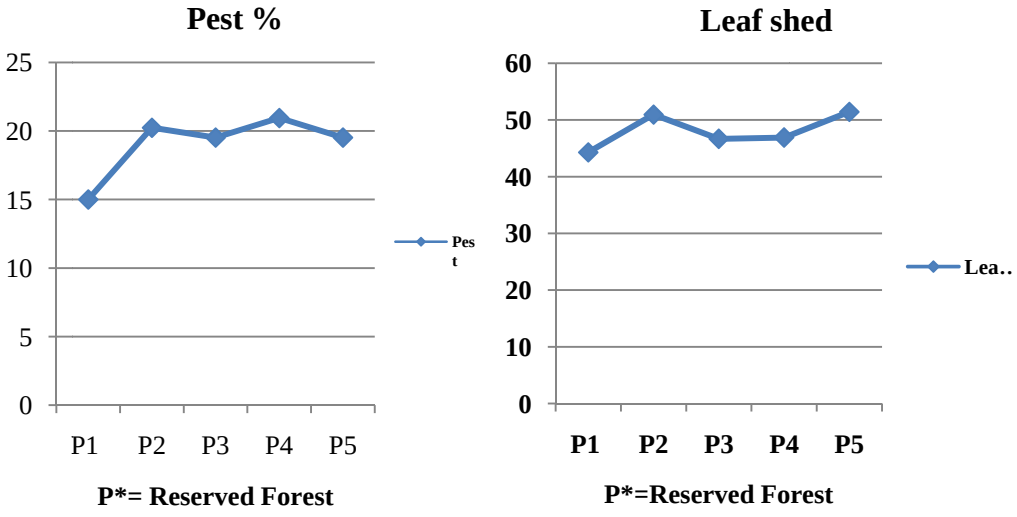


Figure 2. Effect of colonel variation on pest % and leaf shed from provenances.

The effects of different provenance of clones were also affected on leaf size and leaf flush (Figure 3). P2 and P3 were found to have big leaf size. However, P1 was the poorest. CV% was 13.41. For the leaf flush, P1was found the best performance but P2 was the poorest. CV% was 24.53.

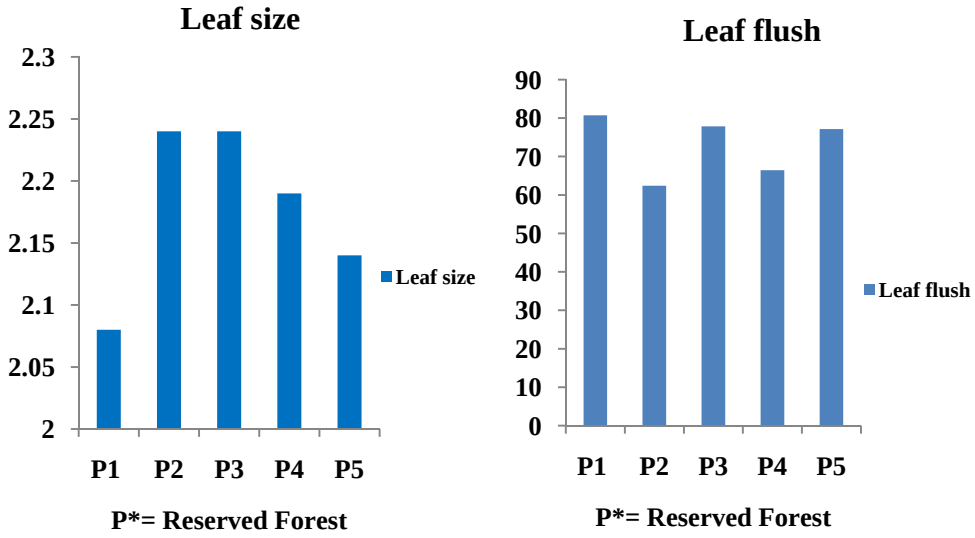
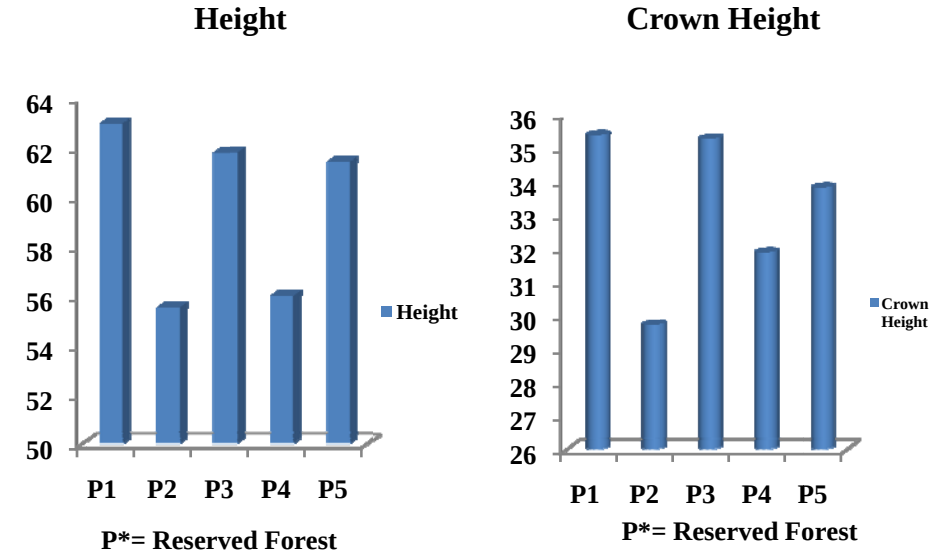


Figure 3. Effect of colonel variation on leaf size and leaf flush from provenances.

The effects of different provenance of clones were also affected on height and crown height (Figure 4). For the height and crown height, P1was found the best performance. However, P2 was the poorest. CV% of height was 11.84. CV% of crown height was 14.11.



Effect of colonel variation on height and crown height from provenances.

The effects of different provenance of clones were also affected on GBH and crown diameter (Figure 5). For the GBH, P3 was found the best performance and P2 was the

poorest. CV% of GBH was 15.19.For the crown diameter, P3 was found the best performance but P5 was the poorest. CV% of crown diameter was 9.14.

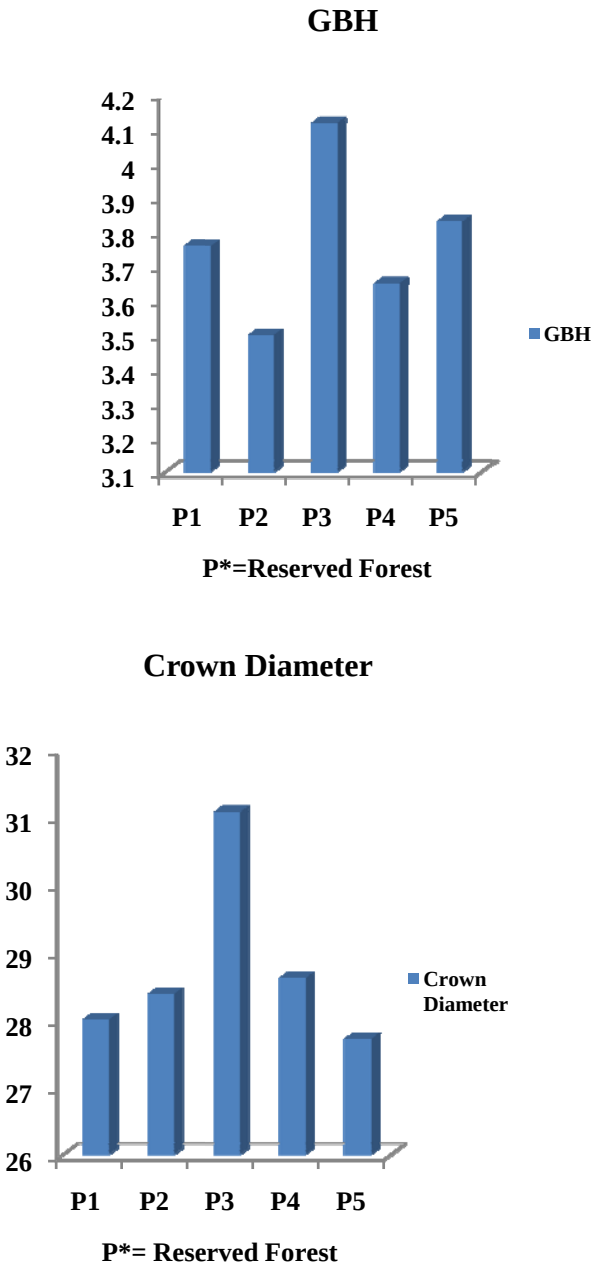


Figure 5. Effect of colonel variation on GBH and crown diameter from provenances.

The effects of different provenance of clones were also affected on stem form and crown position and form (Figure 6). For the stem form, P1 was found the best performance followed by P5. However, P3 and P4 were found the poorest. CV% of stem form was 7.22. For the crown position and form, P2 was found the best performance. But, P4 was the poorest. CV% of crown position and form was 12.62.

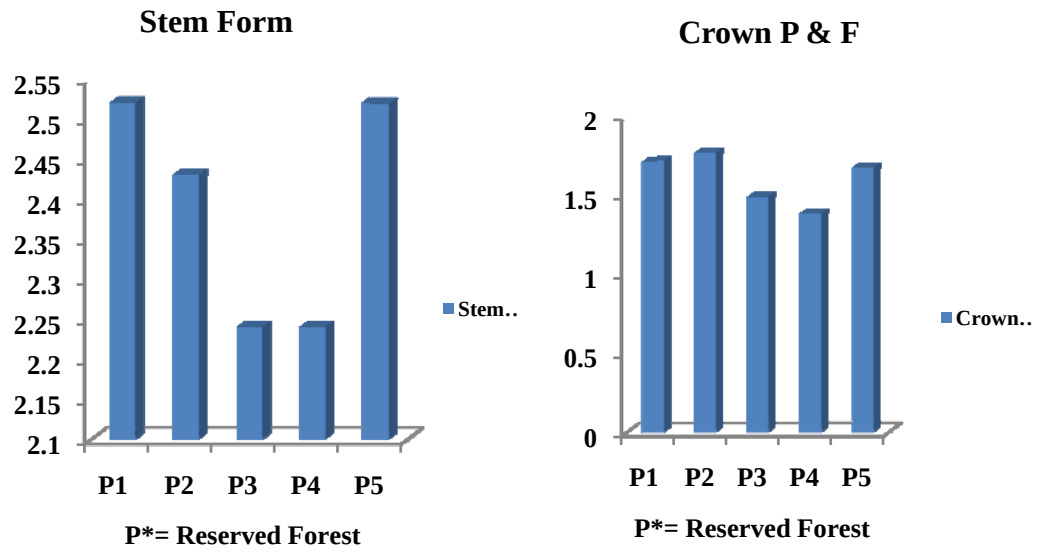


Figure 6. Effect of colonel variation on stem form and crown position and form from provenances.

The effects of different provenance of clones were also affected on no. of > 4' 6" fork, no. of < 4' 6" fork and no. of > 3" branch (Figure 7). For the no. of > 4' 6" fork, P1 was found the best and P2 was the poorest performance. CV% of no. of > 4' 6" fork was 14.11. For the no. of < 4' 6" fork, P3 was found the best performance. However, P2 was the poorest. CV% of no. of < 4' 6" fork was 15.19. For the no. of > 3" branch, P1was found the best performance followed by P5 and P3 was found the poorest followed by P4. CV% of no. of > 3" branch was 7.22.

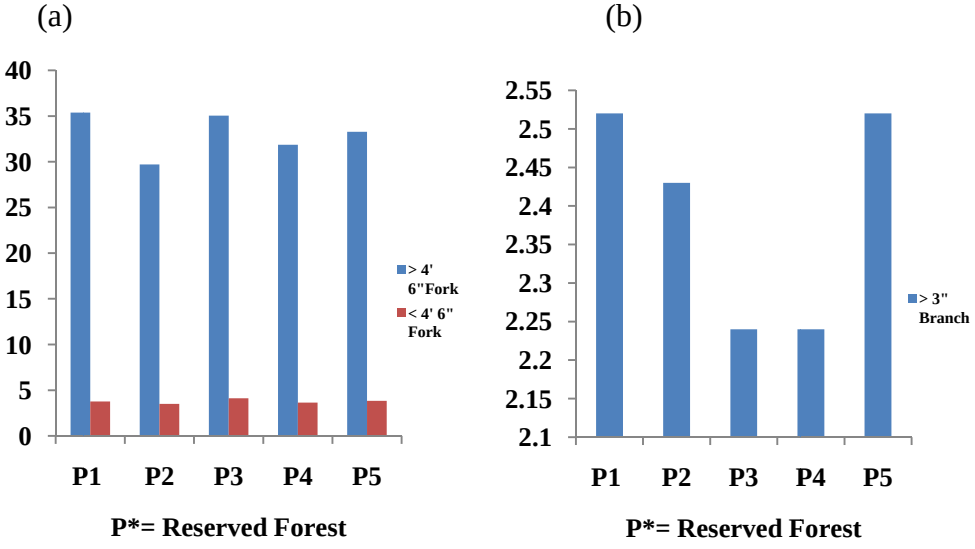


Figure 7. Effect of colonel variation on (a) no. of > 4' 6" fork and < 4' 6" fork and (b) no. of > 3" branch from provenances.

6. Conclusions

Based on the results of this experiment,

1. P1 (Kabaung) was the best performance for leaf flesh, height, crown height and stem form, but the poorest for leaf size and leaf shed.
2. P2 (Bone Taung) was the best performance for leaf size and crown position and form. However, the poorest for leaf flush, height, crown height and GBH.
3. For stem form, P3 (Ngalaik) was the poorest but the best performance for no. of inflorescence, leaf size, crown diameter and GBH.
4. For no. of seed, stem form and crown position and form, the P4 (Sai-ya) was the poorest.
5. P5 (Kaing) was the best performance for no. of seed, leaf shed and stem form, however the poorest performance for crown diameter.

7. Recommendations

Based on results obtained in the present study, the following recommendations are made and should be considered for future research work.

1. Already established plantations of known seed origins should be assessed to get more information of provenance variation.
2. For further conservation purpose, there is an urgent need for provenance collections.

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