Peanut Productivity Under The Albizia Stand With Agroforestry System In Community Forest Magetan East Java Indonesia

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Abstract.
An effort to meet the national food need is by utilizing productive forest areas under albizia stands. Food stuff such as peanuts can grow under albizia forest stands. The purpose of this research was to know success of agroforestry system implemented to tree after initial release of contract. This study was conducted under albizia stand of state forest Magetan in East Java. Research design was used in this study was randomized block design. 5- year- old albizia stages with 0%, 25%, 50 % trimming intensity with plant spacing of 3 m x 4 m, Albizia trees that used for this comparison as many as 90 albizia trees. Results showed that soil lies under 5-year-old albizia trees still produced peanut with highest weights 129 g/m and lowest weight 117 g/m2 while highest biomass about 115.10 g and lowest biomass about 98.23 g. Application of agroforestry system under 5-year-old albizia stand is still good and intensive, creating work, improving social welfare, local community opinion change into positive perceptions for forestry development, forest protection, forest fire prevention, reducing rapid forest degradation and environmental quality conservation of forest areas.

Keywords: *Forest, Environment, National food, Demand, Productive*

1. INTRODUCTION

Food availability is very important for the security and stability of a nation. Increasing demand for food along with increasing population, will affect availability of food produced by community. An effort to meet national food demand by utilizing productive forest areas under albizia stands. Peanuts are a commodity with high economic value and can grow under albizia forest stand. Indonesia produces peanuts around 83.73% while 16.27% remaining must be imported from abroad [1]. Maintaining soil fertility can be done with usage of beans varieties as green manures are widely practiced in modern farming systems due to its ability to inhibit nitrogen, fall of leaves and stems will maintain physical properties of soil [2] .

Utilization of dry land in state forest area is still not optimal, type of woody plant such albizia proved to be favorite choice by many peoples, especially Blitar district of East Java Province. In addition, albizia sale value in wood industry is quite high,

albizia wood type plants proved to have been able to grow well on state forests and communities. Efforts to increase land productivity and fulfill short-term needs for community can be overcome with agroforestry technology that combines timber crops with short-cycle crops. Though, there is problem in agroforestry technology, such as interactions between plants compilers are sometimes competitive in nature with each other, over factors growth (sunlight, water and nutrients). This happens because both plants are adjacent equally require existing resources either in soil (water and nutrients) or above the ground (sunlight). Therefore, it is necessary to arrange good wood plants spacing and canopy pruning as silvicultural actions of agroforestry. The purpose of this study is to determine productivity of peanut (*Arachis hypogeae L*) and growth of albizia stands on agroforestry systems in dry land state forests.

II. METHODS

The study was conducted on below 5 year-old albizia stand in the state forest area which administratively belongs to Magetan state forest East Java region for 4 months from November 2018 to March 2019.

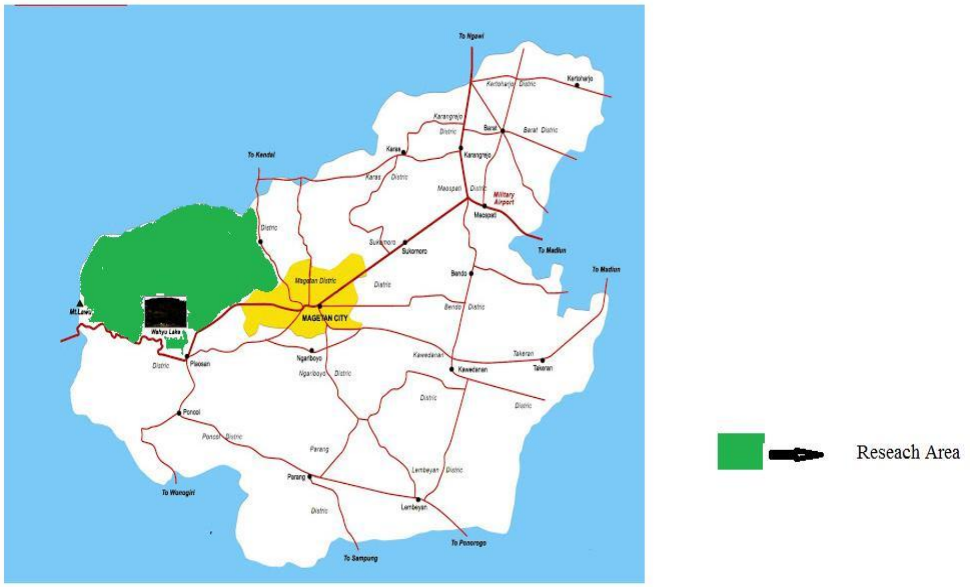

Fig.1 Reseach Area Districc Magetan

Materials needed in this research were albizia stands, peanut seeds, NPK and Urea fertilizers. Tools needed in this study are cameras, thermohydrometer, lux meters and writing tools.

The research design used in the study was randomized block design. Albizia stand is 5 years old with 0%,25%, 50% pruning intensity and a spacing of, 3 m x 4 m. A number of trees were used in data preparation, which was plot tress for 30 trees to deduct edge effect where they have adequate sunlight. Plant design was been

experiment trail such as agroforestry albizia. Underside stand plantation has done when plant season in first season a year, that was peanut plantation.

Data collection in this study was biophysical data (physical and chemical properties of soil, temperature, humidity, and light intensity), growth of albizia (diameter and height) and growth of peanuts (peanut plant weight and dry weight of peanut pods yields). Plant growth and productivity data were analyzed quantitatively and descriptively. Data obtained by statistic analyzing shows influence from main plant growth progress and productivity. If analysis value shows positive result, it means α = 5% according Duncan, this calculation is done with software SPSS ver.16 software and Microsoft excel.

III. RESULT AND DISCUSSION

Fertilizers treatment and their combinations did not significantly affect growth of wet pods. Based on Table 1 above, wet pods weight is larger in N1P1K1 shade with 50 g of 115.10 g. Wet pods weight of or so-called pod weights grow quite well. It has same effect on plant height. This means growth of pod weight is along with height growth of peanut crops. Food supplies in pods will also affect other growth parameters.

Fertilizers have no significant effect on wet pods weight growth statistically. However, when viewed from a farmer scale, 50 g of fertilizer can increase wet pods weight by 16.87 g to control. Main product of peanut plants is the pod, with an increase of 16.87 g for one pod, which will have a huge impact on farmers' income if they harvest peanuts per ha table 1.

Table 1. Peanut biomass value against fertilizer treatment

Treatment	Biomass average (g)
P0K0	98.23
P1K1	100.21
P2K2	106.49
P3K3	105.94
N0P0K0	99.93
N1P1K1	115.10
N2P2K2	101.82
N3P3K3	103.54

The condition of albizia stand which already has fertile soil conditions because albizia leaf litter provides a lot of organic matter to soil under its stand and albizia trees. It is included in Leguminosae tribe containing root nodules. [15] explained that

rooting system of albizia contains many root nodules as a result of symbiosis with rhizobium bacteria. It is advantageous to roots and surroundings. Root nodules existence can help soil porosity and nitrogen provision in soil, thus albizia tree can make surrounding soil more fertile. Such soil conditions can be planted with nuts crops so as to increase income of share croppers.

Age of albizia used in research about 5 years and highest pruning intensity about 50%, make light intensity easy to penetrate soil influence peanut growth and production. With 50% pruning intensity, it is expected increase light intensity that can be tolerated by peanut plants for its production process. Peanuts need an open place for optimal growth. Open space without shade, is a place that optimal for peanut growth and peanut production results. Research Results in [16] showed that peanuts can grow well under albizia stands. Planting peanuts under *Acacia mangium* and *Eucaliptusdeglupta* stand did not work well due to shade and roots of main plants [17]. Teak and peanut agroforestry show that in general, results obtained from agroforestry systems are lower than monocultures, both for actual and potential production [18] .

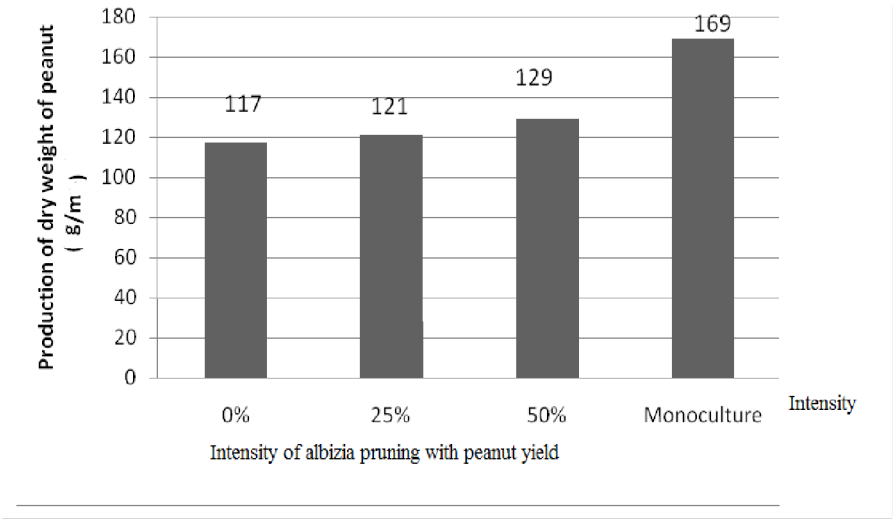

Fig. 2.Peanut yield in various pruning albizia

This was due to competition in obtaining growth factors (water, nutrients and sunlight). Nonetheless, data presented in fig 2 and fig 3 shows that wider spacing result in better growth and production of peanuts in relation to age at which peanuts growth is getting older. This shows that at 5 years old albizia spacing has not given a difference effect in obtaining growth factors. Differences in growth factors are more caused by treatment of pruning intensity. This is in accordance with [19] which states that tree spacing does not have a significant effect on production of peanut annual crops.

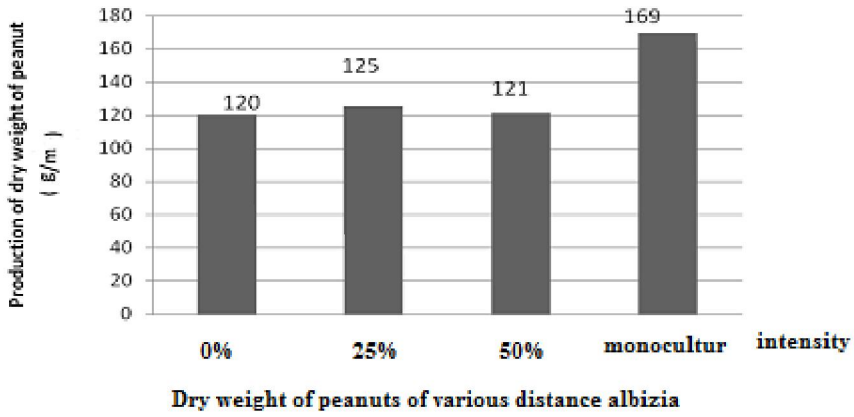

Fig.3. Dry weight of peanuts of various distances sengon

According to [20] plants that suitable for inclusion in intercropping patterns are short-type plants, small leaf crowns, not many branches, mature age and annual, resistant to pest and disease attacks, high yield and not sensitive to sunlight duration. Peanut plants have a lower canopy that can absorb more sunlight and its plants are faster to produce. Peanuts are legume plants that can be symbiotic with Rhizobium so they are able to bind Nitrogen free in air and form root nodules can fertilize soil. According to [21] that intercropping between plants legume and non-legume is perfect because Legume plants can tie N free from air through rhizobium on its root nodules, 30% from N fixation was contributed to other plants in intercropping system. Albizia growth in agroforestry is relatively faster than pattern of albizia planting on monoculture shown by delta (higher diameter growth of lower planting). Albizia and peanuts in agroforestry pattern do not affect competition in obtaining nutrients and water from soil. This is due to different root characteristics. Existence of peanuts in agroforestry planting patterns helps adding nutrients process, especially N this because albizia growth in cropping patterns agroforestry is relatively faster than monoculture. That growth of teak diameter is better in system intercropping peanuts [22].

IV. CONCLUSION

Albizia spacing 3m x 4m has given a difference effect in obtaining growth factors. Provision of fertilizer in peanut plants has no significant effect on wet pods weight growth statistically. Albizia and peanuts in agroforestry pattern do affect competition in obtaining nutrients and water from soil. This was due to different root characteristics

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