EFFECT OF ORGANICMANURE ON GROWTH AND YIELD ATTRIBUTES OF WHITE RADISH (*RAPHANUSSATIVUS L.*) UNDER TEAK (*TECTONAGRANDIS L.*) BASED ALLEY CROPPING SYSTEM.

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ABSTRACT: A field experiment was conducted during zaid crop season (2018) to study the "Effect of Organic manure on growth and yield attributes of white radish (*Raphanussativus* L.) under teak based alley cropping system." at the research farm of College of Forestry, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj - 211007 (U.P.), Experiment laid out in randomized block design with spacing of 8×10 cm and eight level of organic manuresFarm Yard Manure(7272.72 kg ha^{-1}), Neem cake (kg ha^{-1}), Vermicompost (6666.66kg ha^{-1}), NPK+FYM (12.5:50:10 + FYM 50% ha^{-1}), Poultry manure (2666.66 kg ha^{-1}), FYM+Poultry manure (50% + 50% ha^{-1}), FYM + Neem cake (50% + 50% ha^{-1}) and Poultry manure + Vermicompost (50% + 50% ha^{-1}). The result shows that application of different organic manures and their level of combinations on thecrop increased growth and yield of radish v. F1 Classic White. It was recorded from the application combining Poultry manure + Vermicompost fertilizer in treatment T_8 (8x25 + Poultry manure + Vermicompost (50% + 50%)/ha^{-1}) increased Pre-harvest observation viz., Germination %, Plant height, Lenght of leaves, No. of leaves, increased. It was also concluded from trail that the application of organic fertilizers in treatment T_8(8x25 + PM 50% and Vermicompost 50%/ha^{-1}) was found in increasing post- harvest. It was observed that overall yield performance was higher in T_8 (81%) with a treatment combination of Poultry Manure 50% + Vermicompost 50% followed by T_3 (79%) with treatment of Vermicompost. The minimum yield performance was recorded in T_0 (47.33%) with treatment control.

KEY WORDS: FYM, Neem cake, Vermi compost, Poultry manure, Teak, Alley cropping and, Radish

India intends to reduce the emissions intensity of its GDP by 33 to 35 per cent by 2030 from 2005 level and to create an additional carbon sink of 2.5 to 3 billion tons of CO2 equivalent through additional forest and tree cover by 2030. Agroforestry will play a crucial role in meeting the India's Intended Nationally Determined Contribution (INDC) targets as there is no further scope to put more areas under forest land. The major share of the land to be brought under agroforestry will come from fallows, cultivable fallows, pastures, groves and through rehabilitation of problem soils. In addition bunds on agriculture lands are another potential area for agroforestry. **S. K Dhyani 2018.**

Agroforestry plays a vital role in the Indian economy by way of tangible and intangible benefits. In fact, agroforestry has high potential for simultaneously satisfying three important objectives *viz.*, protecting and stabilizing the ecosystems; producing a high level of output of economic goods; and improving income and basic materials to rural population. It has helped in rehabilitation of degraded lands on one hand and has increased farm productivity on the other. At present agroforestry meets almost half of the demand of fuel wood, 2/3 of the small timber, 70-80 per cent wood for plywood, 60 per cent raw material for paper pulp and 9-11 per cent of the green fodder requirement of livestock, besides meeting the subsistence needs of households for food, fruit, fiber, medicine etc. Changing priorities in avenues like green energy, employment generation, carbon sequestration and optimization of farm productivity are now being focused through agroforestry. It is also realized that agroforestry is the only alternative to meet the target of increasing forest cover to 33 per cent from the present level of less than 25 per cent. A major role for agroforestry in near future will be in the domain of environmental services such as climate change mitigation (carbon sequestration), phyto-remediation, watershed protection and biodiversity conservation, and above and all in meeting the targets of reducing the emission intensity through creation of additional carbon sink for carbon di-oxide by increasing tree and forest cover as per INDC by 2030. However, this will need the development of mechanism to reward the rural poor for the environmental services that they provide to society. **AK. Handa*et al.*, 2013.**

Raphanussativus L. is a diploid (2n = 18) species in the tribe Brassiceae of the Brassicaceae family and includes a major commercial root vegetable crop, radish, important for agriculture and human nutrition. It has been defined as a distinct species of the genus Raphanus but is closely related to species in the genus Brassica. Radish (*Raphanussativus* L.) is an important vegetable in East Asia, e.g., Japan, China, and Korea, but not so much in Europe, America, Africa, or Oceania. Therefore, studies on radish are predominantly performed by Asian researchers, and not by Europeans or Americans. Radish is closely related to the genus Brassica, which contains many important crops such as rapeseed, cabbage, broccoli, Chinese cabbage, turnip, and mustard. In

the East Asia, radish roots are thick, long, and mostly white, whereas those are tiny and mostly red in Europe. The East Asian type is called East Asian big long radish, white radish, or daikon (in Japanese), and the European radish type is called European small radish or European garden radish. In Southeast Asia, pods are consumed as a vegetable, and seeds are used as oil seeds. On the other hand, Raphanusraphanistrum, a species in the same genus as radish, is a serious weed in America and Australia, but not so much in Asia. The recent globalization will change the food culture, and Asian big radish may become an important vegetable in the western countries. **Jeong-Hwan Mun*et al.*, 2017.**

Radishes are low in calories and high in vitamin C, folate, and potassium. Radishes contain sulfurous compounds, such as sulforaphane, which have anti-cancer properties, and are expectorant. The early domestication of radishes, evolutionary processes and human selection of preferred types have led to significant variations in size, color and taste of this vegetable crop. Among them, small-rooted radishes are grown in temperate regions of the world and harvested throughout the year. Larger-rooted cultivars such as Chinese radish are predominant in East and Southeast Asia. World production of radish roots is estimated at 7 million t per year, about 2% of the total world production of vegetables. **KasraMaroufi*et al.*, 2011.**

Teak (*Tectonagrandis* L), Famaily. Verbenaceae is one of the most valuable woods in the world. The tree occurs in the primary fore.sts of Thailand, Burma and parts of India and also in the form of cultivated forests in Indonesia. The natural resistance of teak to vegetable and animal parasites is high. **H.H. Dietrichs*et al.*, 1967.**

Teak (*Tectonagrandis* L.) is one of the most valuable and best known tropical timber species and is highly valued for use in shipbuilding, outdoor equipment, furniture, and general carpentry. Teak wood is moderately hard and heavy, seasons rapidly, kiln dries well, and has overall good machining properties. It is prized mostly for its natural durability and high dimensional stability in association with pleasant aesthetics. Some end-user requirements include high heartwood content (at least 85%) and wood density (> 675 kg/m3) and sufficient strength. Teak grows naturally in Southeast Asia and was introduced into other tropical and subtropical regions in Australia, Africa, and Latin America. Teak is now one of the *most* important species for tropical plantation forestry, mostly under intensive short rotation management with 20–30 year rotations. **Vicelina Sousa *et al.*, 2010.**

MATERIAL AND METHODS

The materials, methodology and technique adopted during the course of investigation are described in this chapter under the following heads.

EXPERIMENTAL SITE

The experiment research site (Forest Nursery and Research Centre) situated at Prayagraj at an altitude of 78 m above mean sea level at 28.87 ^{0}N latitude and 98.15 ^{0}E longitudes. All the required materials and facilities necessary for the study are readily available.

SOIL SAMPLING

The soil samples were collected from different plots of within the experimental field with the help of soil auger between 10-15 cm depth from soil surface. The soil samples were mixed together, air dried, finally powdered and again thoroughly mixed. A representative soil sample of 5 gm for each analysis was then taken drawn subjected to mechanical and chemical analysis.

DESIGN AND TREATMENT

The experiment was carried out in RBD (Randomize block design). The treatments were replicated three times and were allocated at random in each replication.

RESULTS AND DISCUSSION

PRE-HARVEST PARAMETERS

It was observed that the germination % which are under shade condition only differing among each organic manures applied. The highest germination % was recorded in T_1 65.11 % followed by T_3 with 62.55 %. The minimum germination % was found in T_2 with 61.44 %.

Perusal of table reveals the maximum Plant height(cm) 20.58 was recorded with T_8 (1333.33 Poultry manure + 3333.33 Vermicompost) kg/ha^{-1}) treatment followed by T_3 with 20.26 (3333.33 Vermicompost kg/ha^{-1}). The minimum plant height was found in T_5 with 19.04 (12.5:50:10+3636.36 FYM 50% kg/ha^{-1}). The result shows that combining vermicompost and poultry manure give the maximum height. The statistical analysis of Plant height(cm) data also indicates that there was significant difference among the treatments.

Similarly, it was observed that the Length of Leaves was higher in vermicompost as compared to other treatments. The maximum leaf length was recorded in T_8 with 18.56 cm at 48 DAS followed by T_3 with 18.40 cm. The minimum leaf length was found in T_0 (control) with 15.12 cm.The statistical analysis of lengthof leaves data indicates that there was significant difference among the treatments.

In case of Number of Leaves, it was observed that the maximum number of leaves was recorded in T_8 with 5.80 followed by T_7 with 5.53. The minimum number of leaves was found in T_3 with 4.67. The statistical analysis of number of leaves data

indicates that there was significant difference among the treatments.

Table-1: Effect ofdifferent organic manures onPre-Harvest parameters of radish (Raphanussativus v. F1 Classic White) under teak alley cropping system.

Treatments	Germination %	Plant Height	Leaf Lenght	Number of Leaves
T0 Control	47.33	17.80	15.12	4.67
T1 FYM 7272.72 kg/ ha^{-1}	60.00	18.03	15.78	5.07
T2 Neem cake 1304.34 kg/ ha^{-1}	67.00	18.42	16.64	5.33
T3 Vermicompost 6666.66 kg/ ha^{-1}	79.00	20.26	18.40	5.73
T4 Poultry Manure 1333.33 kg/ ha^{-1}	52.67	17.90	15.96	4.93
T5 NPK12.5:50:10+FYM3636.36 kg/ha^{-1}	57.00	19.04	16.54	5.23
T6 FYM3636.36+Poultry M 1333.33 kg/ha^{-1}	59.00	18.38	16.05	5.27
T7 FYM3636.36+Neem cake 652.17 kg/ha^{-1}	62.33	18.67	17.16	5.53
T8 PM 1333.33+Vermicompost 3333.33 kg/ha^{-1}	81.00	20.58	18.56	5.80
F-test	**S**	**S**	**S**	**S**
C.D.	0.54	0.82	0.87	0.49
S.E.d	0.26	0.39	0.41	0.23

POST- HARVEST PARAMETERS

It was observed that overall yield (pre-harvest parameters) performance was higher in T_8 (81%) with a treatment combination of Poultry Manure 50% + Vermicompost 50% followed by T_3 (79%) with treatment of Vermicompost. The minimum yield performance was recorded in T_0 (47.33%) with treatment control.

Table-2:Performance of Radish (*Raphanussativus* L.) on the basis of overall performance in response to different levels of organic manures under teak based alley cropping system in response to different organic manures. Post harvesting was done 2 days after final reading of parameters which was taken on. Root length (cm) is taken on the same day of harvesting.

Treatments	Germination %	Plant Height 48 DAS	Leaf Length 48 DAS	Number of Leaves 48 DAS	Root Length (cm)	Yield Percentage 48 DAS
T0 Control	47.33	17.80	15.12	4.67	23	47.33
T1 FYM	60.00	18.03	15.78	5.07	24.7	60
T2 Neem cake	67.00	18.42	16.64	5.33	27	67
T3 Vermicompost	79.00	20.26	18.40	5.73	25	79
T4 Poultry Manure	52.67	17.90	15.96	4.93	24	52.67
T5 NPK +FYM	57.00	19.04	16.54	5.23	30	57
T6 FYM+Poultry M	59.00	18.38	16.05	5.27	23.8	59
T7 FYM+Neem cake	62.33	18.67	17.16	5.53	22.7	62.33
T8 PM +Vermicompost	81.00	20.58	18.56	5.80	28.2	81

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