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Organic Farming In Support of Vrikshayurveda- An Experimental Support

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ABSTRACT

Organic farming is a form of agriculture that relies on techniques such as crop rotation, green manure, compost, and biological pest control. Depending on which the definition of organic farming is described for the use of fertilizers and pesticides covering herbicides, insecticides and fungicides having natural origin for examplebone meal from animals or pyrethrin from flowers, but it excludes or strictly limits the use of various methods (including synthetic petrochemical fertilizers and pesticides; plant growth regulators such as hormones; antibiotic use in livestock; genetically modified organisms human sewage sludge; and nanomaterials. for reasons including sustainability, openness, independence, health, and safety. When we go on ancient Ayurvedic literatures on Vrikshayurveda it is found that during ancient period when synthesis of inorganic fertilizers, hormones antibiotics etc were not described for use on crop or other plants use of crop rotation, animal flesh, bones belonging to different animals and plant parts and Ayurvedic medicines like Triphala, Manjishtha, Ashwagandha, neem, tila along with other ayurvedic formulations or single drugs from about 135 medicinal plants with holistic approach and the plant health were well maintained. Ancient Ayurvedic literatures also describe the creation of mango fruits on banana plants. Use of fish powder or extracts of plants to induce flowering and fruiting are used as tool under Vrikshayurveda. Fumigation from time to time for the control of several diseases is also a part of Vrikshayurveda for the maintenance of plant health which is now being popularized by Homa Therapy and Organic farming even for the maintaining human health. Seeking out all above aspects for creating linkage between organic farming and ancient Ayurvedic literature authors have conducted experiment on pea and gram crops by the use of Neem, Karanj, Behaya and Swet Kutaj just to compare effects of each drug on said crops.

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INTRODUCTION

Vrikshayutveda the study of plant life and plant health management is the practice since ages and various types of definitions, classification of plants physiology, plant diseases and disease management including pest control is a common practice as described in ancient literature (Surpal). Plant health management is typically based Similarly concept of organic farming isa form of agriculture that relies on techniques such as crop rotation, green manure, compost, and biological pest control. Depending on whose definition is used, organic farming uses fertilizers and pesticides (which include herbicides, insecticides and fungicides) if they are considered natural (such as bone meal from animals or pyrethrin from flowers), but it excludes or strictly limits the use of various methods (including synthetic petrochemical fertilizers and pesticides; plant growth regulators such as hormones; antibiotic use in livestock. People, since several decades back are using inorganic synthetic fertilizers pesticides and weedicides which is causing loss of biological phenomena flora and fauna associated with crops. This practice has caused loss of fruitful effects of plants and by the use of such food grains legumes and oilseeds developing various shorts of diseases even the paralysis in human beings. To avoid all these health hazards it is the need of time to adapt the old traditional mode of farming as the concept of organic farming is widely accepted in different part of the World (Budhar et al., 1991; Mahajan and Gupta, 2009; Panda, 2013; Sangwan, et al., 2010; Reddy et al., 2002 and others)[1-10]. Based on the concept of Vrikshayurveda the authors have conducted experiments on cultivation of crop plants by the use of different medicinal plants having insecticidal and pesticide properties on pea and gram cultivation in different beds.

MATERIALS AND METHOD

Effect of fresh leaves of Neem (*Azadirachta indica*), Karanj (*Pongamia pinnata*), Behaya (*Ipomoea carnea*) and twigs of Swet Kutaj (*Wrightia tinctorea*) was studied in separate beds in support of organic farming as well as concept of Vrikshayurveda to find out the efficacy of leaves of plants having anti microbial and anti insecticidal properties. Cultivation of crops like horse gram and wrinkled seeded green peas was made with mixed cropping of Kalmegh (*Andrographis paniculata*) and Tulasi (*Ocimum tenuiflorum*) in rows for protection of crops from various plant diseases. Beds of pea and gram cultivation were prepared by covering the leaves of Neem, Karanj and Behaya in separate beds with one set of control having manure of equal quantity in each bed. Another bed was developed by fixing twigs of Swet Kutaj in different rows.

Pea:

Field experiment was conducted taking Pea (*Pisum sativum* L.) as the test crop. Following treatments were given to the test crop-

1. *Pongamia pinnata* Pierre (leaf) @ 40 kg/ ha
2. *Ipomoea carnea* Jace. (leaf) @ 40 kg/ha
3. *Azadirachta indica* A. Juss. (leaf) @ 40 kg/ha
4. *Wrightia tinctoria* R. Br. (branch) at the corner and centre of the plot.
5. Control

Plots of 4.00 m x5.00 m size were prepared and the seeds were sown in line. Line to line distance was 0.50 m. The seeds were sown in the first week of November, 2015 . On the next day of sowing the above mentioned treatments of green leaves and branches were given. The crop was irrigated frequently. The design of the experiment was RBD . Each treatment was replicated thrice. All the four treatments have been earlier used as green manure by different workers but on Pea no such type of work has been done in Bundelkhand area, therefore a trial has been tested for the above four green manures . The crop was harvested after five months of sowing. The effects of the treatments was seen on the seed yield and dry matter yield and post harvest soil fertility changes.

Gram:

Field experiment was conducted taking Gram (*Cicer arietinum* L.) as the test crop. Following treatments were given to the test crop-

1. *P. pinnata* Pierre (leaf) @ 40 kg/ ha
2. *I. carnea* Jace. (Leaf) @ 40 kg/ha
3. *A. indica* A. Juss. (Leaf) @ 40 kg/ha
4. *W.s tinctoria* R.Br. (branch) at the corner and centre of the plot.
5. Control

Plots of 4.00 m x3.50 m size were prepared and the seeds were sown in line. Line to line distance was 0.50 m. The seeds were sown in the first week of November, 2015. On the next day of sowing the above mentioned treatments of green leaves and branches were given. The crop was irrigated frequently. The design of the experiment was RBD. Each treatment was replicated thrice. All the four treatments have been earlier used as green manure by different workers but on Pea no such type of work has been done in Bundelkhand area, therefore a trial has been tested for the above four green manures. The crop was harvested after five months of sowing. The

effects of the treatments was seen on the seed yield and dry matter yield and post harvest soil fertility changes.

RESULTS AND DISCUSSION

Observations on growth and development of vegetative part and fruiting of the plants were made and ultimate produce was weighed. All the experiments had given better produce as compared to the control plants. The plants of both the crops were free from any kind of plant diseases however; Neem leaf treated plants were given best outcome of produce and the results of various treatment sequence was as follows:

Neem treated plants > Karanj leaf treated plants > Swet Kutaj treated plants > Behaya treated plants.

In this way it is concluded that the neem leaves are the best tool for soil treatment and enhancing produce both as compared to Karanj and Swet Kutaj as well as Behaya though all the three plants can be used as organic tools for enhancing disease free seeds as well as synthetic pesticide free crops. Use of the leaves of Neem, Karanj, Behaya and Swet Kutaj is covering the various aspects of organic farming as it is very economic to collect leaf and twigs, it is helpful in managing pest and diseases in soil, its ingredients are purely organic having no any harm to the human body consuming organic matters.

Pea: Table-1.

S.No.	Treatments	Seeds yield (Q/ha.)	Dry matter yield (Q/ha.)
1.	*P. pinnata* (leaf)	8.58	21.08
2.	*I. carnea* (leaf)	**7.**83	17.00
3.	*A. indica* (leaf)	8.91	18.91
4.	*W. tinctoria* (branch)	7.75	17.75
5.	Control	7.41	13.25
C.D.at 5 %	-	NS	NS

Seed and Dry matter yield:-

Highest seed yield among the five treatments was reported with the *A. indica* (leaf) (Table-1) at 8.91Q/ha followed by *P. pinnata* (leaf) at 8.58 Q/ha followed by the *I. carnea* (leaf) (7.83 Q/ha) and *W. tinctoria* (branch) (7.75 Q/ha) and lowest yield of 7.41 Q/ha was with the control. All the above four plant material used for the treatments posses antimicrobial properties which might have suppressed the harmful microbial population and might have boosted the useful microbes which requires further investigations of the microbial population.

Trends for the dry matter yield were different to the seeds yield (Table -1), it followed the trend-

P. pinnata (leaf) > *A. indica* (leaf) > *W. tinctoria* (branch) > *I. carnea* (leaf) > Control.

Soil Fertility Changes:- Test crop:-Pea (Yr-2015-16). Table-2.

Treatments	E.C.(ds/m)	pH	O.C.(%)	Available-N (Kg/ha)	Available-P (Kg/ha)	Available-K (Kg/ha)
P. pinnata (leaf)	0.66	7.49	1.36	252.44	130.30	171.95
I. carnea (leaf)	0.57	7.54	1.23	246.69	137.52	167.96
A. indica (leaf)	0.69	7.53	1.34	281.09	146.69	238.40
W. tinctoria (branch)	0.79	7.66	1.26	250.56	126.41	224.91
Control	0.70	7.67	1.29	234.26	103.07	216.69
C.D. at 5%	NS	NS	NS	NS	NS	51.61

E.C.-No definite trend for the change in E.C. has been found among the different treatments (Table-2).

pH- With the different treatments pH has been decreased (Table-2).

O.C.- Highest O.C. (1.36 %) was recorded with the *P. pinnata* (leaf) followed by the *A. indica* (leaf) at 1.34%. However, it was lower with the *I. carnea* (leaf) and *W. tinctoria* (branch) than the control (Table-2) which may be due to mineralization of Nitrogen in treated soil.

Available-N-

Highest available-N (281.09 kg/ha) was recorded with the *A. indica* (leaf) which was reflected with the highest seed yield followed by the *P. pinnata* (leaf) (252.44 kg/ha). The available-N with the *I. carnea* (leaf) and *W. tinctoria* (branch) were at par with a very minute difference, the lowest was with the control reflected with the lowest yield and dry matter yield (Table-2).

Available-P-

No definite trend for the available-P was observed. However, with the treated soil it was higher than the control (Table-2).

Available-K-

Lower available-K with the treated soil could be due to higher K uptake by the plant reflected with the higher yield of the crop.

Gram: Table-3.

S.No.	Treatments	Seeds yield (Q/ha.)	Dry matter yield (Q/ha.)
1.	*P. pinnata* (leaf)	10.59	52.38
2.	*I. carnea* (leaf)	12.49	45.23
3.	*A. indica* (leaf)	14.16	55.95
4.	*W. tinctoria* (branch)	11.07	38.09
5.	Control	9.75	34.52
C.D. at 5%		2.58	4.24

Seed and Dry matter yield:

Highest seed yield among the five treatments was reported with the *A. indica* (leaf) (Table 3) at 14.16Q/ha followed by *I. carnea* (leaf) at 12.49 Q/ha followed by the *W. tinctoria* (branch) (11.07 Q/ha) and *P. pinnata* (10.59 Q/ha) and lowest yield of 9.75 Q/ha was with the control. All the above four plant material used for the treatments posses antimicrobial properties which might have suppressed the harmful microbial population and might have boosted the useful microbes which require further investigations of the microbial population.

Trends for the dry matter yield were different to the seeds yield (Table- 3), it followed the trend-

A. indica (leaf) > *P. pinnata* (leaf) > *I. carnea* (leaf) > *W. tinctoria* (branch) > Control.

Soil Fertility Changes:- Test crop:-Gram(Yr-2015-16). Table-4.

Treatments	E.C.(ds/m)	pH	O.C.(%)	Available-N (Kg/ha)	Available-P (Kg/ha)	Available-K (Kg/ha)
P. pinnata (leaf)	0.97	7.50	1.11	210.84	103.21	297.77
I. carnea (leaf)	0.89	7.56	1.12	194.74	74.88	279.16
A. indica (leaf)	0.69	7.48	0.99	214.29	67.41	240.63
W.tinctoria (branch)	0.80	7.56	1.13	202.34	105.73	331.76
Control	0.73	7.48	1.22	178.81	83.63	412.19
C.D.at 5 %	NS	NS	NS	NS	NS	NS

E.C.- No definite trend for the change in E.C. has been found among the different treatments (Table- 4).

pH-With the different treatments pH has been increased except in *A. indica* (leaf) treated soil (Table- 4).

O.C.- Highest O.C. (1.22 %) was recorded with the control. Lower O.C. with the treated soil could be due to mineralization of nitrogen in treated soil.

Available-N-

Highest available-N (214.29 kg/ha) was recorded with the *A. indica* (leaf) which was reflected with the highest seed yield and dry matter yield followed by the *P. pinnata* (leaf) (210.84 kg/ha) and *W. tinctoria* (branch) (202.34 kg/ha) and *I. carnea* (leaf) (194.74 kg/ha). The lowest available–N was with the control (Table-4). Higher available-N in the treated soil was reflected with the higher seed yield and dry matter yield (Table-4).

Available-P-

No definite trend for the available -P was observed (Table-4). However, with the treated soil lower available-P could be due to higher P-uptake by the plant which is reflected by the higher yield of the crop (Table-4).

Available-K-

Lower available K with the treated soil (Table-4) could be due to higher K uptake by the plant reflected with the higher yield of the crop.

DISCUSSION:

Use of plant leaves and shoots as manure is rice and other crops is common trend in India and other Countries. Experiments have already been carried out by the use of leaves of *A. indica, C. gigantea, P. pinnata, Leucaena leucocephala* to enhance the growth and yield of rice in different doses and proved to be a good crop yield managing plant (Budhar et al., 1991)[1]. The neeem tree (*Azadirachta indica*) is noted for its drought resistance (www.worldagroforestry.org/treedb/AFTPDFS/Azadirachta_indica).

P. pinnata (leaf) is also used as green manure, animal fodder and plant medicines in India. Use of leaf of *I. carnea* and *A. indica* has already been described (Panda, 2013)[2]. Mahajan and Gupta (2009)[3] also described the use of leaves of *I. carnea* and *P. pinnata* in rice and wheat cropping system. Plants of *W. tinctoria* is also used as green manure by World Agro forestry Centre (www.worldagroforestry.org/treedb/AFTPDES/Writia. where in branches are trampled into the puddle soil in rice field with the concept of green manure. In Tripura stem branches of *Holarrhena antidysenterica* are used in paddy field to make the soil free from insect and nematodes. Reddy et al., 2002[5] assessed the Antibacterial, antifungal activities and antinociceptive activities of water extract of air dried leaves and bark of *W. tinctoria* are known (Reddy et. al, 2002[5]; Anushraj et al., 2013[6]). Accordingly, the systemic studies of the use of leaves of *A. indica, I. carnea, P. pinnata,* and stem branches of *W. tinctoria* on separate crops of peas and gram was carried out and proved to be effective in different chronological order for each crop.

CONCLUSION:

The use of *P. pinnata* (leaf), *I. carnea* (leaf), *A. indica* (leaf) and *W. tinctoria* (branch) as a green manure is beneficial in increasing the yield of the Gram and pea crops as well as improving the soil health.

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REFERENCES:

1. Budhar MN, Palanippan SP, Rangasamy A. Effect of farm waste and green manures on low land rice. Indian. *J. Agronomy* 1991; 36 (2) : 251-252.

2. Mahajan A, Gupta RD. *Integrated Nutrient management (INM) in a sustainable rice – wheat cropping system.* 2009; Springer.
3. Panda H. Integrated Organic Farming Handbook. Asia Pacific Business Press Inc. 2013.
4. Sangwan S, Rao DV, Sharma RD. A review on *Pongamia pinnata* (L.) Piers. A Great Versatile leguminous plant. *Nature and Science* 2010; 8(11): 130-139.
5. Reddy YSR, Venkatesh Sama, Ravichandran V, Murugan Suresh B. Antinociceptive activity of Writia tinctoria bark. *Fitotropia* 2002; 735: 421-423.
6. Anushraj, Chandrashekhar R, Adake P, Rao SN, Santanusaha. *Writia tinctoria* an overview (A review article). . J. Drug Delivery and Therapeutics 2013; 3(2): 196-198.
7. Anonymous. Writia tinctoria plant used as green manure in India Plantnet project.org./en/ Writia tinctoria (PROSEA) 2016.
8. Mondal, Eureka, Chakraborty Kaushik. *Azadirachta indica* – A tree with multifaceted applications: An overview J. *Pharmaceutical Sciences and Research* 2016; 8(5):299-306.
9. www.slideshare.net/steamexpress/ pongamia pinnata. Jul.2, 2010.
10. www.worldagroforestry.org/treedb/AFTPDFS/Azadirachta_indica