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Research Article

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Influence of *Azolla* as organic compost on cultivation of Sarpagandha Plants

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Abstract: Sarpagandha (*Rauvolfia serpentina* (L.) Benth. ex. Kurz.), a well known medicinal plant of family: Apocynaceae is used in therapeutics worldwide since ancient times. In present study, sarpagandha plants were treated with different doses of *Azolla* compost. After 400 days of cultivation, sarpagandha plants were studied for dry matter yield and chlorophyll contents. *Azolla* showed remarkable increase in dry matter yield as well as chlorophyll contents of sarpagandha. In culture medium, the effect of *Azolla* organic compost on the growth and composition of sarpagandha plants grown on soil-pot was analyzed that proved that in future, *Azolla* can be used as better source of organic compost for cultivation of medicinal plants.

Keywords: *Azolla*, Organic compost, *Rauvolfia serpentina*, Sarpagandha.

Introduction

The journey of human civilization started with the acquaintance of useful plants and organized farming thereof. Initially they catered their food demands with wild plants and vegetables. By and by, they started to use plants for shelter or housing, medicines, clothing etc. and became more dependent on plants for various usages. Shifting cultivation was a rule in ancient time as the soil fertility was exhausted after several crops were grown on a piece of land. Then came the farming based on manures which continued till the end of the 18th century. This was the period when inorganic fertilizers were introduced to the farmers and gradually the use of organic compost was overtaken by inorganic fertilizers. From 1960s onwards, the use of inorganic or chemical fertilizers got a boost and also resulted in crop production, but it also caused a number of environmental problems. Consequently, the organic cultivation was realized once again.

The utility of *Azolla* as organic compost in India is limited to research activities only. On the other hand, rice has been cultivated in 60,000 and 40,000 hectare of agricultural land in China and Vietnam using *Azolla* as organic compost. Cultivation of *Azolla* has great opportunities in the context of India because it is cheap, eco-friendly, and a non-toxic source of organic compost. The economical potential of Azolla provides a great opportunity for India, where labour cost is low and 60% farmers are the owners of small fields or are marginal farmers.

The need to feed the increasing populations of the less developed nations and the aspirations of rural communities for a standard of living above that of mere subsistence, dictates that agriculture in these countries must become more productive. As the farming systems are becoming more intensified, to meet the food demand of the increasing population worldwide, we must provide the technology to achieve this and ensure that increased productivity is sustainable, with the minimum of environmental degradation and loss of species diversity. Weed control will continue to play an important role in raising farm productivity. Increased dependency on wild foods has been documented as a dietary supplement as population increases and agricultural land become scarce. As woodland areas are replaced by grassland and arable land there is an increase in species, including many annual weeds, which thrive in the new habitats. However, as areas of common property decrease, protection and privatization of wild foods increases and attempts to domesticate wild species also occurs to ensure their supply. Wild vegetables are important in the diet of rural communities worldwide.

Today, several types of biological or organic fertilizers are very popular. Some of them are vermicompost, dung manure, agro waste manure, blue green algae, *Azolla* etc. *Azolla* is a well known genus of aquatic pteridophyte that naturally occurs in tropical, semi tropical and normal temperate regions of entire globe. It is a free floating and rapidly growing aquatic fern that

occurs on the surface of water. It is a good source of biological nitrogen as it grows in symbiotic association with blue green algae *Anabaena azollae* which is a great source of biological nitrogen that can be directly used as a biofertilizer. The present study deals with the effect of *Azolla* as organic compost on growth and composition of *Rauvolfia serpentina* [L.] Benth. ex. Kurz. (Sarpagandha) plants.

Materials and Methods

For the experiment, fresh *Azolla* plants were collected from ponds and ditches of Kanpur (U.P.) and adjacent areas. *Rauvolfia serpentina* (L.) Benth. ex. Kurz. (Sarpagandha) plants were raised in soil-pot culture condition. All selected plants were almost equal in shape and size. Soil was mixed with *Azolla* as organic compost as nil (0), 50, 100, 150, 200 and 250g *Azolla* / kg soil. There were three replicates for each treatment. Calculated amount of distilled water was applied daily to the pots to provide equal moisture conditions in each pot as far as possible. Root, stem and leaves of 400 days old sarpagandha plants were taken from estimation of dry matter yield was determined by drying stem, leaves and root samples of sarpagandha in a forced drought oven at 70°C for 24 hours of constant weight. Chlorophyll contents were determined by method of Petering *et al*., (1940) and Saxena (2001). Agnihotri *et al*., (2007) did significant research on *Azolla*. Mohan *et al*., (2004), Raja *et al*., (2012) and Bindu (2013) studied the *Azolla* and its significance from different point of views.

Table 1: Influence of *Azolla* as Organic Compost on 400 days old *Rauvolfia serpentina* [L.] Benth. ex. Kurz. (Sarpagandha) plants.

Plant Part	*g Azolla* / kg soil						L.S.D.	
	Control	50	100	150	200	250	P = 0.05	P = 0.01
g dry matter yield / plant								
Roots	33.83	35.02	46.68	47.32	50.12	55.22	0.51	.072
Stem	23.16	23.38	33.65	34.00	34.07	34.17	0.16	0.22
Leaves	22.82	23.38	33.20	33.53	33.68	33.77	0.13	0.20
mg chlorophyll / 100g FM								
Leaves	30	37	41	44	41	40	2	4

Results and Discussion

Performance of *Azolla* as organic compost on dry matter yield and chlorophyll contents of 400 days old sarpagandha plants is arranged in table no. 1. 250 g Azolla/kg soil level showed maximum increase in dry matter yield of stem, leaves and roots of 400 days old sarpagandha plants. Similarly, 250g Azolla/kg soil level showed maximum increase in chlorophyll content of leaves of 400 days old sarpagandha plants. Most of the level of Azolla supply showed significant (P = 0.05) or highly significant (P = 0.01) increase in dry matter yield and chlorophyll contents of 400 days old sarpagandha plants. An increase of 63.2% in dry matter yield of roots was observed as compared to control roots, while 33.3% increase in chlorophyll content was observed as compared to control (Table 1).

Utility of *Azolla* as organic compost showed remarkable increase in dry matter yield of various food crops as well as medicinal plants. A big number of researchers found better results while using *Azolla* as organic compost on different crops such as rice, wheat, barley, corn, banana, coffee, potato, tomato, taro and okra etc.

Moore (1969), Patel *et al*., (1980), Pillai (1982), Kohle and Mitra (1990) and Datta (2000) observed that application of Azolla increased the dry matter yield of rice crop in different climatic conditions. Ram and Prasad (1982) observed increasing results using *Azolla* as organic compost on wheat (*Triticum aestivum*) crop. Periera and Shetty (1987) reported that *Azolla* has a huge potential for raising the production of coffee. Saxena (2001) reported that *Azolla* is very effective manure for barley production.

Agnihotri (2008) and Agnihotri and Mohan (2012a and 2012b) reported good performance of *Azolla* in dry matter yield on Safed musli and Sarpagandha plants. Application of *Azolla* as organic compost also increased the chlorophyll contents of plants. Kalita and Sharma (1994) and Agnihotri (2008), Agnihotri and Mohan (2012a and 2012b) found beneficial results while using *Azolla* on chlorophyll contents of rice plants.

Conclusion

Due to the ever increasing usage of chemical fertilizer and their hazardous effects, the demand of agricultural products and medicinal plants grown by organic methods is increasing rapidly day by day in all around the world including India. Azolla has a great potential as organic compost in this field in the context of India. Thus, there is a great possibility of increasing the use of Azolla in agriculture in India. Another benefit of use of Azolla is its ability to protect and conserve the quality of marine life in ponds and small water bodies. Seeing the water crisis in present times, ponds, lakes and other sources of water are being conserved or renewed all over India. Culture of Azolla can be performed in these water bodies which will not only eliminate the usage of chemical

fertilizers in farming, but also help us conserve the natural water resources. Hence, it is obvious that the use of Azolla in agriculture as an organic compost can be a boon to Indian agriculture industry.

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