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Research Article

SOYBEAN, A BENEFICIAL INTERCROP WITH ERI SILKWORM FOOD PLANT

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ABSTRACT
Sericulture is one of the major crops in the rural area of our country which is already in shortage of income. Total annual consumption of silk in the country is more than domestic production. Sole mulberry crop could not meet with the regular financial requirement of the farmers; therefore, soybean can be a beneficial intercrop with Silkworm food plant farming. It increases the income as well as employment for the rural families. This industry is at high risk, resulting in frequent crop failures to the farmers. Intercropping is another way by which this problem can overcome. Legumes can be grown as intercrops profitably paired with mulberry in the inter row space. Legumes also fix atmospheric nitrogen in soil thus, increasing the soil fertility. Villagers generally depend upon wildly growing host plants which do not help in the proper production of raw silk. Hence, in order to encourage them to take systematic plantation, it was felt essential to find out ways to increase farmer income. The available space in between the host plant can be utilized to grow short term fast growing and high yielding crops as intercrops, which may increase the economy per unit area of land along with the increase production of yield for rearing. Legumes can play very vital role as an intercrop as they are also used as green manures in a cultivation cycle to replenish organic matter, thus, resulting in beneficial effects on soil. In the present study Soybean was used as intercrop along with Silkworm food.

Keywords: *Legumes, Intercropping, Rearing, Soybean, Eri Silkworm and Economy*

INTRODUCTION
Sericulture is one of the major crops in the rural area of our country which is already in shortage of annual income. Sericulture needs intensive labour in all its phases from cultivation of silkworm food plants to finishing product. India has the distinction of cultivating all the four commercially known varieties of silk, namely Mulberry, Tasar, Eri and Muga (Bongale *et al.*, 1992). India is the second largest producer of silk in the world with 14.57 per cent share in global raw silk production after China in a year. India produced around 4,050 mt (Tasar, Eri and Muga) in a year, which has very good market (Bongale *et al.*, 1992). Total annual consumption of silk in the country is more than domestic production. The additional requirement of silk is imported mainly from China and other country. Therefore, there is a scope for production of additional quantity of silk in the country to meet the domestic demand.
As we knew, mulberry leaves are the only sole food for mulberry silkworms. However, farmers frequently come across silkworm cocoon crop loss due to various diseases (Dayakar Yadav and Nagendra Kumar, 1997). This can be overcome by better sericultural practices. The concept of intercropping comes to the rescue of the farmers by alternate source of income from the same piece of land (Dayakar Yadav and Nagendra Kumar, 1992). However, intercropping does not benefit larger farmers but is well suited to small and medium farmers. In sericulture, mulberry is the base crop with distinct row arrangements with other useful crops. In mulberry, various intercrops can be taken up all the year round without adversely affecting the yield of mulberry. Intercropping in mulberry would increase the margin of profit further (Dayakar Yadav and Nagendra Kumar, 1997). The ever increasing need for food, clothing and shelter from the limited land on account of increased human population, has forced man to evolve the means for increasing the economic returns from a unit area of land. In this context, intercropping is the economically viable alternative, which mainly emphasize on diversification of crops and intensification of land best use (Misra *et al.*, 2001). The importance of intercropping in farming practice has been recognized in India for many centuries and the Indian farmer is practicing this system in some form or the other. This also helps in equitable and judicious utilization of land resources and farming inputs including labour. It is evidenced that increased yields are possible with intercropping over sole cropping. One of the main reasons for such advantage is that the component crops are in some way able to use resources differently, so that when grown together they complement each other and make better use of growth resources, than when grown separately (Hadimani *et al.*, 2004).
Introduction of leguminous crops between the rows of main plantation crops of silkworm food not only protects the soil but also increases the fertility due to accumulation of nitrogen through symbiotic nitrogen fixation by nodules (Prasad and Brook, 2005). Nitrogen contribution of legumes can undoubtedly be vital for maintaining soil productivity over long periods. Thus, legumes are partially independent of the soil for their nitrogen requirement and hence play an important role in improves quality of poor soils.
Intercropping is regarded as an important agricultural practice to improve crop production and environmental quality in the regions with intensive agricultural production. Eri silkworm feeds primarily on castor leaves, but sufficient castor leaves are not available throughout the years for commercial rearing. Therefore, Kesseru (Heteropanax fragrans Seem) is best used as an alternative food plant during the scarcity of castor leaves. Kesseru (Heteropanax fragrans) plant is less susceptible to disease and pests in comparison to Castor. Kesseru feed silkworm produce small cocoons but they are compact with strong

fiber. Therefore, systematic Kesseru plantation is recommended and popularized among the farmers for large scale commercial Eri silkworm rearing.

MATERIALS AND METHODS

The field study was undertaken during kharif season at Dhar Block of Kandi area. Healthy plants of uniform girth, height and age under similar cultural practices were selected for the experiment. The space available between them was used for intercropping. The Combinations laid out in a randomized complete block design (RCBD) with three replications and intercropped with three rows of legume crop i.e. soybean which is very useful intercropping (Mohan *et al.,* 2006).

The spacing in between trees were 3 meter Randomized Block design was followed with 11 replications Central plot were maintained without intercrop but given similar cultural operations (Mohan *et al.,* 2006). The distance between soybean plants was 10cms and between rows 40 cms. In this experiment Eri Silkworm food Plant was intercropped with Soybean. For this experiment the plot size was taken 11* 2 mtrs appropriate for better production of intercropping. Fertilizer was not applied during this period of experiment. Seeds are sown in 2.5 cm deep and 10 cm apart in rows made at a distance of 15 cm for better results (Kipkemoi *et al.,* 2010).

RESULTS AND DISCUSSION

Following results were analyze from the under given Table. Intercropping results were very good and also yield of leaves from dry matter percentage was also good as compare to sole Kesseru crop, which may probably due to the addition of nitrogen to the root nodules of soybean (Wu *et al.,* 2012). It was also observed that weed population reduced which may have resulted in the reduction of competition and thus, may have contributed to the better leaf yield. Besides this soybean intercropping has shown an additional income very much, it is very much clear from given table (Lv *et al.,* 2014). Increasing the no. of leaves, Dry matter and leaf Yield in case of intercropping as shown in given table. It can thus be conclude if suitable intercrop with suitable package of practices is introduced in between host plants; it can very well increase the income per unit area of land. Eri silkworm feeds primarily on castor leaves, but sufficient castor leaves are not available throughout the years for commercial rearing (Midega *et al.,* 2014). Moreover, Soybean production also increase quantum / hectre in case intercropping and total revenue increase RS/hec. Net additional gain was 1040 Rs in case intercropping rather than sole production.

Table 1: Effect of Intercrop Soyabean on Growth of keeseru (Hetreropanex fragrans L.) and its Yield and Economics

Treatment (Intercrop)	Heteropanex Fragrans					Yield & Economics				
				Weeds/sq. mt.						
	No. of Leaves	Dry Matter %	Leaf Yield (One Harvest) q/hec.	Days Treatment 15	After 45	Soyabean Yield q/hec.	Total Revenue. Rs./hec. Rs./hec.	Cost of Cultivation/ Maintenance Rs./hec.	Net Additional Gain	Cost of Leaf Kg./Rs
Sole Kesseru	30.18	30.24	24.19	1434.09	1503	-	-	1000	-	3.532.41
Kesseru and Soyabean	33.27	33.16	26.87	915.00	755	5.63	2815	1775	1040	

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