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JAWAHAR MODEL FOR DOUBLING INCOME OF RESOURCE CONSTRAINED MARGINAL FARMERS: ECOLOGICAL AND ECONOMIC BENEFITS

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Abstract
Small and marginal farmers (SMFs) are the major group of farmers in India, constituting 81 percent. These resource poor and distressed group, together contribute substantially to the national food basket. Yet their mean monthly income is just around Rs.6426. Introduction of cash crops in their crop production system can be one of the storage to increase or double their household income. Jawahar model developed by Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur is a low input versatile and adoptable option to double income of SMFs in India.

Keywords : Agriculture system, Cash crop, Diversification, Intensification, Socioeconomic

Background
Low net return from crop production especially among small and marginal farmers (SMFs) is one of the many causes of farmers' distress. In India, SMFs constitute about 81 percent and in MP it is 71 percent. The national mean monthly household income of farmers in India is around Rs 6426 and Rs 6210 in MP. The land holdings of SMFs range from less than an acre to five acres, but their contribution to the national GDP significant. Majority of the farmers in this group are resource constrained and practice rainfed farming. Rainfed farmers are sometimes also referred as Critical diverse risk prone farmers (CDR), due to the multitude challenges and constrains they face in their fragile and hostile farming situations.

SMFs, thus are the most productive group and together they contribute 82 percent to the national food basket, overcoming their CDR situations at ground level. Evidently, to improve the micro-economy the need is to be focused on improving the net returns among SMFs. Doubling of farmers income (DFI) and Per drop more crop(PDMC) are the national focal points in the farm sector. Cash crop can play a vital role in DFI as well adoption of micro-irrigation system of SMFs for PDMC. However, inclusion of cash crop as a component in the existing crop production system dominated by cereals and pulses is equally a difficult task. Initial investment for cash crop and drip irrigation system along with the gestation period of at least 2 to 3 years are the main factors that deter many of them, inspite of subsidiaries offered. Having always faced multiple risks, they avoid further risk even at the cost of productivity or net returns.

There is an intense search at local and national level for a reliable solution to the address distress and disparity of SMFs. Based on our over two decades of experience of promoting Lac production among resource poor SMFs and forest dependents in MP, we at JNKVV Jabalpur has developed and evaluated 'Jawahar model for doubling income of resource constrained marginal farmers (JM-DFI)'.

Jawahar model for doubling income of resource constrained marginal farmers (JM-DFI)

1. **Concept and components :** SMFs are rain dependent farmers. *Kharif* (July to October) is the main cropping season of majority of these SMFs, followed by a prolonged lean period till June,

when their fields remain fallow. Migration or non-agricultural activities for survival takes places during this period. Thus, the basic concept of JM-DFI was to help timely sowing of their crop without waiting for the rain; diversify their crop production system to minimise risks while ensuring inflow of cash at short intervals for financial growth; and finally engage farmers throughout the year in their own farm for social well being.

a. Flexibility

JM-DFI promotes flexibility in the choice of cropping pattern and enterprise, in accordance to the local climate, resources and demand. This gives the farmer an opportunity for small scale experimentation and innovation

b. Intensification & diversification

Rainfed farmers grow traditional crops - tolerant to moisture stress, generally as sole crops but many a times also as mixed or with intercrops. In any case the maximum cropping intensity rarely exceeds 125 percent. Farm income and cropping intensity are directly related while diversification ensures regular inflow of cash and minimises economic losses due to crop failures. In JM-DFI, though the main crop is a long duration pigeon pea but short to mid duration intercrops and associate crops add flavour of iintensification and diversification in the Model.

c. Low input

Higher farm productivity with minimum input cost or expenditure is another factor that has been taken care. The substrate mixture of Kapu, FYM and bio-fertilisers gradually drives the farmer to almost organic farming. Wider spacing and intercrops increases the diversity crops and insects that keep the pests under check, reducing the application of pesticides as well as the residue load of pesticides on the harvest.

d. Minimum disturbance

As almost all the crops are grown on substrate filled polypropylene bags of varying capacity and size, the field is not ploughed. No tillage and weeding reduce operational costs; additionally cause minimum disturbances to soil microbes in the rhizosphere. Similarly weeds that covers the soil surface retains soil moisture than the tilled soil it also sequesters carbon.

e. Increases resource use efficiency

Among SMFs, family labour is the most abundantly available resource while land and water are scarcely available resources. Efficiency these resources to increase the productivity were the main concern that was tried to addressed in the JM-DFI. Prolonged lean period that leads to migration, for waged labour and fallow field are the wasted resources of SMFs which can be put into productive use.

f. Components

i. **Physical:** Empty polypropylene bags (PPBs) are used fertiliser bags available with farmers can be used. The size depends on the crops to be taken or local availability. *Kapu* (riverbed basin soil) or light soil is the basic component of the substrate to be used for growing crops in the PPBs. Water is another essential component but required in comparatively in lesser volume, but

ii. **Biological:** Seeds and planting material of the chosen crops to be grown. Use of well rotten FYM (Farmyard manure) enriched with bio-fertilizers (PSB, Rhizobium, Asperigilus, Mycohrizza, *Trichoderma viride*) helps to promote growth and multiplication of soil microbes in the rhizospheric zone of the crops. As the plants grow in height in the JM-DFI,

staking is essentially required. Branches or bamboo used for staking also provides perching sites for birds that prey on the insect pests.

2. Economy

The focus of JM-DFI is improvement in farm economy of SMFs with poor soil and limited irrigation facilities. No till, weeding and application of chemical fertilisers as well as wider spaced plantings (6x6 ft for pigeonpea; 3x3 ft for intercrops) in JM-DFI require much lesser seeds and planting materials. Lesser pest incidences due to wider spacing also reduces pesticides cost. In traditional agriculture these operations and input incur high initial investment in crop production. A major reduction in this high initial investment is the essence of JM-DFI and slowly driving them to organic farming.

Water is another economic component and scarce resource of SMFs. JM-DFI encourages judicious use water and only at the plant bases avoiding spilling even a drop of it. For every drop of water spend there has to be more crops reaped. It can be drip irrigation or by irrigating each plant in PPB. SMFs with their small holdings and sufficient family labour can manage their scarce water resources to improve farm economy by adopting JM-DFI. Regular income and low external input is the core principle of JM-DFI.

Plate 1 : Broadview of crops in early stage

Plate 2 : Survival of water sensitive crops during excess rain

Plate 3 : High poding of pigeonpea in polypropylene bags

Plate 4 : Turmeric, tomato, chili, leafy vegetables in polypropylene bags

Plate 5 : Cotton crop in polypropylene bags

Planting of spices (turmeric, ginger, corriandar, chilli, garlic, mint), tuber crops (potato, colcassia, onion), vegetables (cucurbits, sarson, spinach, fenugreek, brinjal), oilseed (mustard), cash crops (cotton, papaya, sweet corn, betelvine, strawberry, lac) and flowers (marigold, chrysanthemums) as intercrops in between pigeonpea in half acre of land, ensures inflow of cash in shorter intervals. Birds and insects (ants, butterflies, bees, moths, etc) in the field are indicators of increase in bio-diversity. Continuous presence of weeds and grasses promotes soil microbial population and soil moisture. The Model is monitored through "Realtime digital distance monitoring system' installed in the field.

In a recent study (Khichi, 2020) based on Jawahar Model conducted on ten pigeonpea lines including nine local and a released variety TJT-501, the yield of lac was found to varied from 131.8 to 414.5g, seed yield (597.6 to 1433.8g), fuel wood yield (836.1 to 4746.6g) and economics of lac production per pigeonpea plant ranged from 72.5 to 195.9 rupees.

In another study (Vishal, 2020) lac yield was found to be ranged from 283.8 to 397.5g, seed yield (708.7 to 1143.6g), fuel wood yield (1049.8 to 5430.6g) and economics of lac production per pigeonpea plant ranged from 119.7 to 157.1 rupees.

References

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