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Jawahar Model –A Crop Production Model for Resource Poor Farmers

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Background

Madhya Pradesh is a state of diverse agro-climate and cropping pattern. Thus, diversification and intensification is expected from farmers in the State. However, it is not happening because the agricultural sector in the state is dominated by small and marginal farmers. Together they constitute nearly 72 percent of the farming community in MP. Majority of them are resources poor and also economically disadvantaged.

In MP cereals, pulses and oilseed are the dominant group of crops during both *kharif* and *rabi* season. High inputs, long waiting periods for return from the investments made and fluctuating market price are the main constraints of these small and marginal farmers. Their economic conditions can be improved if they get cash regularly at shorter intervals. Vegetables and a few cash crops are possible solutions for frequent inflow of cash to these small and marginal farmers.In order to address this cash trapped situation, JNKVV, Jabalpur developed Jawahar Model.

The model is easy to adopt with varying degree of flexibility. The mandatory ploughing operation as well as weed management being not necessary, brings down the cost of cultivation considerably. The crops in the model are grown in substrate filled polypropylene bags (PPBs).

Zero tillage

Natural resources are precious, their effective and sustainable management are very important aspects. As there is no field preparation and weeding in Jawahar model, it saves energy consumption upto 30 percent. Since there is no tillage the soil remains undisturbed.

Zero tillage is adopted in the Jawahar model, where the tillage is completely eliminated by using PPBs.The soil moisture is maintained for longer duration in PPBs. Irrigation are done in individual PPBs, it is as per crop demand. The model is particularly

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helpful in areas with water scarcity and limited power supply.

Vegetation and soil being undisturbed, enhances soil microbial activities and carbon sequestration in the long run. The soil nutrients also remain trapped in the PPBs,so thier the roots of the plant in the PPBs is comparatively more accessible to soil nutrients and evidently without competition. This is unlike that on land, where it is subjected to leaching and exploitation by weeds.

Weed problem

Weeds are detrimental to productivity of agricultural crops, and their management is a major challenges. Weeds can rapidly access and utilize limited natural resources, such as water, light, soil nutrients and space. Their ability of weeds to grow faster is due to overcoming abiotic factors and have better nutrient use efficiency than the crops cultivated. In Jawahar model plant grown in PPBs, weeds can be easily managed manually without weedicide application.

Soil Nutrition management

Major (N, P, K, Ca, Mg, S) and minor (Fe, Zn, Cu, B, Mn etc) nutrients are required for good plant growth, its development and production. Nutrient supply to plants depends on many factors, conditions and situations. Loss of nutrients due to leaching, leakage and stealing by weeds is well known. This has an impact on plant growth as well as production.

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In Jawahar model as crops are raised in PPBs, the losses of soil nutrients is minimized and the root hairs get maximum access to the nutrients available. Thus the growth is better and the production also increases. The plants in PPBs can be protected from various types of diseases, affected plants can be treated individually.

Water management

In India, agriculture is rain dependent. In many regions of the country, water is scarce. Madhya Pradesh with ten agro-climatic zones receives rainfall varying from 575 mm to 1190 mm. In the state, *kharif* is the main cropping season. Prolonged dryspell during the *kharif* crop period creates abiotic stress and impacts the crop growth.

In Jawahar model, the PPBs, with crops can overcome the water stress by either drip irrigation or by manual irrigation of individual PPBs. The model is generally suggested for implementation in the Backyard. A normal sized Backyard can accommodate about a hundred PPBs .Each PPBs requires one litre of water at seven days intervals. In the absence of an irrigation system or power supply, a member of the household can easily irrigation 100 PPBs in a very short period. Generally a bucket of water is about 10 litres and the capacity of a common mug is one litre. Thus 10 bucket full of water is required to irrigation 100 PPBs at seven days interval.

Cropping intensity and diversity

Nutrition security implies economic and social access to balance diet, pure drinking water, safe environment and health care for every individual. Indian diet is predominated by cereal-pulse. This food pattern is qualitatively deficient in micro-nutrients iron and vitamins (A and B). This phenomenon is referred as hidden-hunger. It is due to low intake of pulse, vegetable and fruits. Changing dietary habits and growing mal-nourishment among working populations in India is a matter of grave concern. Similarly, as mentioned earlier, mono-cropping pattern has impacted the inflow of cash at shorter frequency.

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In Jawahar model crops especially vegetable, oilseed, tuber crops and pulses can be raised in PPBs are intercrop easily. Such an approach increases the crops diversity and intensity, shortening the gestation period for returns from harvest.

Management of insect-pests and diseases

Yield losses of crops are due to incidence of insects pest and diseases. Proper management can reduce both the incidence and pesticides load on the crops. Dense planting and timely improper diagnosis are also reasons for yield losses. Minor correction approaches may help in reduction of PPBs yield losses.

Normally, pigeon pea are grown at a spacing of 75cm x 75cm. In the model, the crop raised PPBs are kept at a spacing of 6 feet x 6 feet. Wider spacing allows the plant to grow laterally and vertically to gain a bigger canopy. The space between the rows are utilized to grow vegetables, tubers crops in PPBs.

Crops diversification and better spacing helps to reduce the incidence of insect-pest and diseases. The stakings used to hold the pigeon pea plants serves as bird perches. The birds pickup the insects on the crops. Generally incidence of soil born diseases in any field is difficult to management. In the model, as crops are grown in substrate filled PPBs, in case any incidences of soil born diseases removing the entire PPBs or treating a few PPBs is effective and economic. This can minimize the economic loss.

Low inputs

More profit is also harvesting more.It is very important to reduce the cost of cultivation. Proper use and management of natural resources is very important to achieve it. In Jawahar model, PPBs is filled with a mixture of farm yard manure along with *kapus*oil, the substrate is treated with a consortium of soil microbes for better utilization of soil nutrients.

Pest management is a very important process for the good production of a crop.

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Farmer spends 30 to 40 percent to achieve this. In Jawahar model, marigold are planted as a trap crop, this reduces pesticides use and load on the crops.

Resource management

There are 10 agro-climatic zones in MP, indicating variations in water availability, vegetation and weather factors, crop management. Such varing agro-ecology is challenging and requires mobolisation of resources. Thus growing crops in PPBs reduces soil, manure, water as well as labour cost. The crops can be grown continuously throughout the year in a systematic manner, even in places where farmers are unable to grow crops profitably. Jawahar model serves as a simple, accessible and consistent system.

- ✓ Using PPBs such as by growing the attractive crop, protecting the main crop from the attack of harmful insects, as well as reducing the cost of the farmer by reducing the use of pesticides and besides this, the attractive crop increase the economic benefit by taking production from the crop as well.
- ✓ Minimizing water problems by using drip irrigation and adopting the concept of "Per Drop More Crop".
- ✓ Filling of proportion of manure and soil according to the crop selected in the cropping system.
- ✓ Providing adequate spacing for mixed and inter-cropping system etc.