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INTRODUCTION

The global population has passed seven billion mark in 2011 and the projected growth in the world's population to nine billion by 2050 adds an extra challenge for food security. The demand for agricultural commodity is growing world over and to meet the ever increasing targets as per the demand, productivity needs to be raised further. According to the statistics, the average land holding size was 2.28 hectares in 1970-71, which was reduced to 1.82 hectares in 1980-81, and to 1.50 hectares in 1995-96. With the infinite subdivision of the land holdings, the size of the holdings will further decrease. It has been reported that the number of small or marginal agricultural land holdings (called operational holdings) has increased marginally over the past decade. This means that there are more people who now own smaller parcels of agricultural land. As per the latest information available from Agriculture Census, the average size of operational holdings has decreased from 2.28

hectares in 1970-71 to 1.84 hectares in 1980-81, to 1.41 hectares in 1995-96 and to 1.08 hectares in 2015-16. The problem of small and fragmented holdings is more severe in densely populated and intensively farmed states like Kerala, West Bengal, Odisha, Bihar and eastern Uttar Pradesh, where average land holdings are less than one hectare, and in some areas they are even less than 0.5 hectare. Hence, Precise application of resources is need of the day to increase the yield and productivity in Agricultural field.

Multilayered farming is one of the best alternatives for maximizing the use of land, labour, and capital resources with the lowest possible production cost and input usage. Multi layer farming or multi tier farming is an advance way of integrated intercropping which allows growing multiple crops on the same piece of land in a specific time. It is one type of intercropping. In this integrated farming method, four or five different crops are cultivated in the same field in a specific time. It uses a multi-layer seed sowing method where different vegetables and fruit crops are sown in deep, middle, top and topmost layers of soil based on their respective root zone. The objective of the multi-layer farming technique is to utilize vertical space more effectively. The tallest components in this system will have foliage that requires a high amount of sunlight and will have high transpiration demand. The shorter components will be those which require shade and high humidity. This method will help the farmers to get a good yield and more earnings from the same piece of land using the available resources. It also solves the problem of feeding the growing population due to less availability of cultivable land.

BENEFITS OF MULTILAYER FARMING

- Good utilization of soil and water
- Reduces whether the effect on the crop field
- Keep ecological balance in the environment.
- Prevent water evaporation from the soil; as an effect, 70% of water is saved.
- The income per unit area increases substantially
- Minimize risks of crop yield loss
- Generates jobs and provides better labor use patterns.
- Reduces the impacts of hazards such as high-intensity rainfall, soil erosion, and landslides.
- Effective utilization of leaching materials and helps in effective weed control.
- Reduces some pests and diseases, and weed does not come out. Increase biodiversity which can reduce pest and disease pressure.
- Provide micro-climate conditions that advantage crops underneath.

STEPS OF MULTILAYER FARMING

Firstly, a 36 x 36 sq ft plot is identified. Crops are selected based on height and growth duration to ensure adequate sunlight and different harvesting cycles so that households have continued access to different kinds of produce throughout the year. Sowing is done in a strategic manner so that multiple crops including fruits, vegetables and flower crops could be grown together in the plot. The rain pipe irrigation method, which uses less water, and organic farming practices are adopted. Apart from these basics, there is a bit of science behind the practice and activities that are part of multilayer farming. One needs to ensure the process is sustainable, organic, and

productive in the face of the unfolding climate crisis too. Excess produce is sold on a weekly basis, generating additional profit for the concerned farmer.

STEPS INVOLVED IN MULTILAYER FARMING

Land preparation:

In the 36 X 36 feet plot, before preparation of beds, 300 kg of cow dung or vermicompost with one kg of Trichoderma powder is applied to the soil. Trichoderma is a biocontrol agent – a biofungicide that prevents fungal infections in plants and plant roots.

Bed preparation:

Eight beds of 3 X 36 ft are prepared with 1.5 to 2 ft space left in between. They need to be readied in the North-South direction so that plants receive adequate sunlight. After preparing the bed, one feet deep channels are dug to drain excess water.

Planting

Saplings are planted in a zigzag manner - papaya / drumstick on the first, third, fifth and seventh and banana, maize and pigeon pea on the second, fourth, sixth and eighth bed. Two chilli seedlings are planted around each sapling on the first, third, fifth and seventh, and similarly marigold on the second, fourth, sixth and eighth bed. Black gram seeds are sown on each bed between chilli and marigold. At a distance of 15 cm from the middle of each bed, radish on the first, third, fifth and seventh bed and beetroot on the second, fourth, sixth and eighth bed, are planted. Similarly, at a distance of 15 cm from the middle of each bed, ginger/turmeric on the first, third, fifth and seventh bed and dolichos beans (ghevda) on the second, fourth, sixth and eighth bed,



are grown. In the third row on the first, third, fifth and seventh bed, coriander seeds (dhane) are sown, and spinach on the second, fourth, sixth and eighth bed. At a nine feet distance from first and third trench, okra is planted in a zigzag fashion, brijnal at the second and tomato on the third, are planted.

Red pumpkin is grown at the edges of the first bed, and ridge gourd at the edges of the eighth bed. Castor is planted along the channel at every 9 feet and maize at 4.5 feet. Cow pea (chawli) is sown between the castor and maize.

CONCLUSION

Multitier cropping systems are dynamic interactive Practices aimed at better use of the production components Such as soil, water, air space, solar radiation and all other Inputs on sustainable basis. Highest gross return, net return per day profitability and seed cotton equivalent yield were obtained with the multi-tier system of cotton + radish + cluster bean + Beet root. The introduction of non competitive, short duration, multi Intercrops into sole cotton, salvaged the risk perturbed by monocropping. Higher production, economic return and resource utilization. Realized with multi-tier system of BT cotton + radish + cluster bean + Beet root were advantageous in more than one ways. Thus, higher Yield and profit could be realized with the introduction of multi-tier cropping in a unique tier-arrangement in BT cotton hybrids under irrigated condition, the bulletin suggested.