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Enhancing Farmers Income through Intercropping of Vegetables in Apple Orchards Practicing SPNF System

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1. Introduction

Himachal Pradesh is a prominent producer of fruits and vegetables, with apple being the leading cash crop. However, apple productivity has witnessed a steady decline in recent years. This decline can be attributed to various factors, including:

- Poor orchard management practices
- Changes in cultivation methods
- Overreliance on chemical fertilizers and pesticides, leading to:
    - Increased production costs
    - Deteriorating soil health

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- Environmental pollution

Subhash Palekar Natural Farming (SPNF), formerly known as Zero Budget Natural Farming (ZBNF), emerges as a viable alternative to address these challenges. SPNF promotes sustainable and cost-effective farming practices that are environmentally friendly.

2. SPNF System and its Principles

SPNF emphasizes natural methods to cultivate healthy crops and maintain soil fertility. Here are some core principles of SPNF:

- **Intercropping:** Growing two or more crops simultaneously in the same field throughout the year. This practice maximizes resource utilization (land, water, sunlight) and increases overall productivity.
- **Jeevamruta and Ghanjeevamruta:** These are fermented microbial concoctions prepared from cow dung, urine, and other natural ingredients. They act as bio-fertilizers and bio-pesticides, promoting microbial activity in the soil and boosting plant growth.
- **Mulching:** Covering the soil with organic material (straw, leaves) helps retain moisture, suppress weeds, and promote earthworm activity.
- **Local Breeds:** SPNF encourages the use of indigenous cow breeds for dung and urine due to their higher microorganism content.
- **Natural Pest Management:** SPNF utilizes formulations like "astra" (derived from local plants) to manage pests and diseases instead of chemical pesticides.

3. Intercropping in SPNF system:

Under Subhash Palekar Natural Farming, intercropping is one of the most important practices for sustainable production system. Growing of two or more crops of different species in a year from the same piece of land at a particular time on same piece of land is termed as intercropping. It adds diversity to the farm plant population and results in increased cropping intensity and productivity. It improves the crop productivity due to increased plant efficiency for utilization of sunlight with an adequate spatial distribution of various plant architectures in fruit crops. The interspaces between the fruit crops is utilized for growing short duration cash crops mainly leguminous crops which not only sustain the orchard during the non-fruiting months of the main crop but also add to the fertility of the soil by enhancing the soil health. The nutrition and cultural activity done in intercrops in turn benefits the main crop. In some instances, the intercrops act as cover crops and add to the organic carbon pool of the orchard soil.

Vegetables are considered as the best intercrops because of the shallow root system, short duration, and more market demand less competition with the main crop. Intercropping of vegetables in fruit orchard not only maximize the resource utilization in terms of land, labour and

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other inputs but also play a pivotal role in minimizing the risk of crop failure by ensuring and enhancing the net income per unit of area. Hence, intercrops add value to the orchard soil, provide a sustainable income and improve the productivity of the main fruit crop. In the study, intercropping of vegetables (peas, beans, cabbage, fenugreek, garlic, rajmash etc) was practiced, and at a time more than two crops were cultivated with main crop in the field, which contributed for additional gross income upto Rs. 2, 87,805/- per hectare, besides income from the main crop. The vegetables and other crops were grown in apple orchards all year round as given below:

- Pea – October/November to March
- Bean – Feb/March to August
- Rajmash – August to October
- Fenugreek – March to May, Nov to Feb
- Garlic –October to March
- Cabbage- July- November

So, more than two crops in a single field can be harvested, which, provide higher profit from the same piece of land.

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Fig. 1: Intercropping with a) garlic b) pea and c) bean

4. Benefits of Intercropping Vegetables in Apple Orchards using SPNF

Increased Income and Reduced Costs:

- Intercropping vegetables with apple trees allows farmers to harvest multiple crops from the same land, generating additional income. Studies have shown an increase in gross income by up to Rs. 2,87,805 per hectare.
- SPNF eliminates the need for expensive chemical fertilizers and pesticides, significantly reducing production costs for farmers.

Improved Soil Health and Fertility:

- Regular application of Jeevamruta enhances the population of beneficial microbes in the soil, leading to improved nutrient availability for plants.
- Continuous use of leguminous crops (e.g., peas, beans) as intercrops fixes atmospheric nitrogen in the soil, enriching it for future crops.
- Mulching practices help retain soil moisture, promoting the activity of earthworms, which further improves soil structure and fertility.

Reduced Disease and Pest Risks:

- The diversity of crops grown in an intercropping system disrupts the life cycle of pests and diseases, making the overall orchard environment less vulnerable.
- SPNF utilizes natural pest management techniques like "astra" formulations, which are less harmful to the environment compared to chemical pesticides.

5. Case Study: Three-Year Study at RHR&TS Mashobra

A three-year research project conducted at RHR&TS Mashobra evaluated the effectiveness of SPNF in apple and vegetable cultivation. Key findings include:

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- Successful integration of five to six intercrops (peas, fenugreek, beans, cabbage, garlic, marigold, and rajmash) with apple trees.
- Significant increase in soil fertility and earthworm activity in SPNF plots compared to conventional practices.
- Effective management of pests and diseases using natural formulations derived from local resources.
- Increased net income for farmers due to higher yields from both apple trees and intercrops.

5. Conclusion

Intercropping vegetables in apple orchards using SPNF practices offers a promising solution for apple farmers in Himachal Pradesh. This approach not only reduces production costs but also improves soil health and generates additional income. The diversification of crops through intercropping also enhances the overall resilience of the orchard ecosystem by reducing disease and pest risks. By adopting SPNF practices, apple farmers can achieve sustainable production and improve their economic well-being.

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