

## Crop Diversification as a Means of Agriculture Resilience

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India after independence was not able to feed its population with food grains produced during that time and faced severe food scarcity due to increasing population. Government of India has started a number of programmes for increasing the production of food grains and Green revolution proved to be the most successful programme implemented for increasing food production with the help of hybrid seeds, fertilizers, pesticides, irrigation facilities etc. But the cropping system of rice-wheat in northern India has led to various issues of groundwater depletion, crop residue burning, deteriorating soil health, contaminated groundwater etc. This necessitated crop diversification as a means of improving the soil health conditions and food security to the people.

**Crop diversification:** It refers to addition of new crops or cropping systems to agricultural production on a particular farm taking into account the different returns from value added crops with complementary marketing opportunities (Khanam *et al*, 2018).

**Need of diversification:** Crop diversification is an important means of food security as yield stagnation has been observed in a number of crops. Moreover, it leads to more effective use of resources on the farm leading to higher income opportunities to the farmers. It generates employment to the farmers and raises their living standards. It reduces the risk associated with agriculture and ensures economic stability of farming community. Crop diversification is also very beneficial in mitigating the issues associated with aberrant weather conditions to some degree particularly in dry land areas.

**Types of diversifications:**



1. Horizontal diversification: It refers to cultivation of multiple crops instead of cultivation of a single crop. It is beneficial for small farmers and allows them to fetch more income by increasing cropping intensity.
2. Vertical diversification: It refers to expansion of activities such as processing, packaging, branding etc. involved in value addition to the product.

#### **Diversification of agricultural systems (Lin, 2011):**

1. Increased structural diversity: It provides more structural diversity to the crops grown within a field. E.g. strip intercropping which involves cultivation of two or more crops in strips which causes intercrop interaction yet allows independent cultivation. It results in pest suppression.
2. Genetic diversity in monoculture: It involves cultivation of a number of varieties of a species in a single crop. It leads to disease suppression and increase production stability.
3. Crop rotation: It provides temporal diversity at the farm level through cultivation of different crops at different times. It results in disease suppression and increased production.
4. Polyculture: It includes both spatial and temporal diversity of crops. It involves cultivation of two or more crops within a field at the same time. It helps in mitigation of climate variability, increases production and suppresses disease infestation.
5. Diversify field with noncrop vegetation: It involves growing of weeds in strips or vegetation along with crops. It leads to pest suppression. It suppresses the pest infestation.
6. Agroforestry: It involves cultivation of crops along with trees. It also buffers the effect of climate change and suppresses pest infestation.
7. Mixed landscapes: It involves developing large scale diversified landscapes with multiple ecosystems. It suppresses the pest infestation.

#### **Advantages of crop diversification:**

1. Reduction of risk factor as in case of failure of one enterprise or crop, the other enterprise or crop can supplement his income.



2. Increase in production as a number of crops are harvested from a same field, it ensures a definite amount of income.
3. It generates additional employment in agricultural sector.
4. It has substantial impact of increasing soil fertility and control of pest infestation.

#### **Crop diversification as a means of mitigating climate variability:**

Climate change is projected to cause increased temperature and altered precipitation in near future. Moreover, the weather extremes are also projected to increase in the future which can have detrimental effect on agricultural yield (Malhi *et al*, 2021). These changes are also expected to increase the pest infestation as warm and humid conditions are more suitable for proliferation of insects and diseases. Under this scenario, crop diversification is recognized as an effective mitigation and adaptation strategy (Lakhran *et al*, 2017). It has been observed that the detrimental effects of climate change on agriculture can be minimized by following a holistic and integrated approach of crop diversification. Climate shocks can be mitigated through crop diversification and its benefits of adaptation are more visible in long run (Birthal and Hazrana, 2019). Diversification act as buffer in farm business risks and reduces both production risk because of adverse of adverse climatic conditions and price risk linked with marketing.

#### **Conclusion:**

The monocropping cultivation along with increased use of fertilizers and pesticides over the years had led to deteriorating soil health, increased insect pest infestation and consequently yield stagnation in some crops. This necessitates the diversification of crops so as to ensure income stability of the farmers by reduction of production and market risk. Crop diversification is proven useful in maintaining soil health and biodiversity and ensuring sustainability in the arena of climate change.

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