NEW ERA AGRICULTURE MAGAZINE

Advantage of Intercropping system in Sustainable agriculture

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Introduction:

Sustainable agriculture is described as farming systems that are capable of maintaining their productivity and usefulness to society indefinitely. Such systems must be resource-conserving, socially supportive, commercially competitive, and environmentally sound. Farming sustainably, means growing crops and livestock in ways that meet three objectives simultaneously: economic profit, Social benefits to the farm family and the community, and environmental conservation. Sustainable agriculture can be understood as an ecosystem approach to agriculture. In this regard, it is the type of agriculture that is more efficient in the use of resources such as soil and water, for the benefit of human, and is in balance with the environment. This perceived form of agriculture aims at maximizing on-farm productivity and profit without compromising the integrity of the off-farm environment. Agriculture in the 21st century faces multiple challenges: it has to produce more food and fibre to feed a growing population whiles the available arable lands are highly competed for other infrastructural development.

The approach to increasing food production in recent times has been an increase in crop productivity per unit hectare, which requires the adoption of more efficient and sustainable cropping systems and production methods. Cropping system refers to crops and crop sequences and the management techniques used in a particular field over a period of years. Farmers practice different cropping systems to increase productivity and sustainability. Intercropping as a type of sustainable agriculture can be exploited to achieve sustainable farming.

Types of intercropping systems

A. **Mixed intercropping:** Broadcasting the seeds of both crops or dibbling the seeds without any row arrangement. It is easy to do but makes weeding, fertilization and harvesting difficult. Individual plants may compete with each other because they are too close together.

B. **Row intercropping:** Planting both the main crop and the intercrop in rows. The rows make weeding and harvesting easier than with mixed intercropping.

C. **Strip Inter-cropping:** Growing two or

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more crops simultaneously in different strips wide enough to permit independent cultivation but narrow enough for the crops to interact ergonomically.

D. **Relay inter-cropping:** Growing two or more crops simultaneously during part of the life cycle of each. A second crop is planted after the first crop has reached its reproductive stage but before it is ready for harvest. This helps avoid competition between the main crop and the intercrop. It also uses the field for a longer time, since the second crop (the intercrop) usually continues to grow after the main crop is harvested.

Application of intercropping in modern agriculture:

Intercropping is the presence of two or more crops in the same field at the same time, planted in an arrangement that results in the crops not competing with one another for resources. Though an ancient practice, intercropping is still widespread in most of the developing world. Cereals such as maize (Zea mays L.), sorghum (Sorghum bicolor (L.) Moench), or millet (Panicum and Pennisetum spp.) are intercropped with grain legumes such as pumpkin (Cucurbita spp.) cowpeas (Vigna unguiculata (L.) Walp), pigeon peas (Cajanus cajan (L.) Millsp.), or beans (Phaseolus spp.) in Africa, whiles maize is grown with beans and squash (Cucurbita spp.) in the tropical Americas. In both Africa and Latin America, beans or peas (Pisum sativum L.) climb tall cornstalks while pumpkins or squash cover the ground below. Farmers within these countries are notably limited in their efforts to accessing agricultural resources and inputs, which characterizes most of the developed world . Besides, intercropping is much less risky in that if one crop fails another or the others may still be harvested.

Advantage of Intercropping System-

1. Soil fertility- Growing different plant species in the same area can enhance soil fertility. While one plant may deplete specific nutrients from the soil, other may have different nutritional requirement. In this way, the risk of one-sided nutrient depletion of the soil is reduced and the soil become more nutritionally balanced.
2. Pest and disease control: Intercropping is one of the integrated pest

management strategies used to reduce the population density of pests in cultivated plants.

3. Weed control: Weeds are known to negatively impact crop yields through competition or allelopathy. Intercropping is more effective in suppressing weeds compared to sole cropping.
4. Preservation of natural balance: Different plants in polyculture can help maintain a natural balance. For example, some plants can repel pests, while other can improve soil quality or attract natural enemies of pests. This reduces the need for chemical interventions and supports natural biological balance.
5. Increased productivity: One of the primary reasons for intercropping is to enhance overall yield. Plant diversity enables more efficient utilization of soil resources and can lead to increased crop production. In addition, the different growth rates of plants and their ability to adopt to the seasons allow more effective use of the field or garden area.
6. Water and energy conservation: Intercropping helps optimize water and energy usage. For instance, taller plants can provide shade and reduce water evaporation for shorter plants. It can also help plants use water and nutrients more effectively, as the root systems of plants spreads to different depths.
7. Biodiversity: Polyculture enhance biodiversity. Different plant species attract animal and insect species, supporting the diversity of natural life within the ecosystem.
8. Sustainability: Intercropping contributes to agricultural sustainability. Reduced use of chemical fertilizers and pesticides leads to less soil and water pollution, causing less harm to natural ecosystem. Also, growing a variety of plants can help maintain ecosystem more resilient and long-term.

Conclusion:

Intercropping has many advantages especially for the developing world. When factors such as climatic conditions, timing of the intercrop planting and the crop use for the intercrop are right, then the intercropping will be very successful. Intercropping systems are an important strategy for agricultural sustainability and productivity. By growing different plant species together, diversity and ecosystem health in agricultural area are enhanced. Plant diversity allows for more efficient use of soil resources, resulting in increased soil fertility. Additionally, the spread

of pests and disease is prevented, reducing the need for chemical control methods. Intercropping reduces soil erosion, enhances water retention capacity, and promotes biodiversity.