



GUIDANCE

AGRICULTURE TECHNICAL WORKING GROUP (ATWG)

Intercropping Agriculture System

Definition of an Intercropping Agriculture System

An intercropping agriculture system is the cultivation of two or more crops simultaneously on the same field. The most common goal of intercropping is to produce a greater yield on a given piece of land by making use of resources or ecological processes that would otherwise not be utilized by a single crop.

Whenever two or more crops are planted together, they will compete or facilitate (assist) for light, water and nutrients. Therefore, they could have a negative or a positive influence on each other. Successful intercropping depends on a good balance between competition and facilitation. Examples of strong facilitation is where legumes improve soil quality due to their nitrogen fixing character or where a second crop acts as a cover crop which shades the soils and increases water retention or serves as a windbreaker that shelters a crop or reduces wind erosion. The other side of the coin is where the secondary crop competes with the primary crop for moisture, space and nutrients.

Intercropping is a cultural practice in integrated pest management (IPM) systems involving the growing of different crops in the same field. There are many spatial combinations possible for intercropping, including mixed intercropping, in which different crops are planted in the same row or without regard to row, and row intercropping, which involves planting different crops in alternating rows. Although it is an old practice the recent interest in intercropping as an IPM tool is the result of concerns about the potential negative impacts of pesticides on human health and the environment, pesticide resistance, the resurgence of insect pests and general considerations related to agricultural production.

The objectives of an intercropping agriculture system are to:

- a. Maximize the production of available arable land, especially when the area available for cultivation is small compared to the total population in the targeted locations.
- b. Improve income for farmers through the creation of additional income from their orchards.
- c. Create job opportunities (especially, cash for work (CFW) for agricultural services, harvesting and marketing of the planted crops).
- d. Improve food diversity and food security in the target locations.
- e. Improve the biodiversity and the agro-ecological system not only for crops, trees, but also for other organisms.
- f. Improve soil fertility and organic material due to intercropping with legume crops which will increase natural nitrogen resulting from the decomposition of the nitrogen nodes.
- g. Decrease the use of chemical fertilizers, which are costly and harmful to groundwater and soil, especially through intercropping with legume varieties.

- h. Protect the soil from erosion.
- i. Complement fertilizer needs between crops, i.e. plant legume crops.
- j. Increase land use efficiency, by planting different crops either at different periods or by varying their harvesting times, in this case once the main crop has been harvested the second crop will continue to mature and hence income will increase, and the land will be utilized in an efficient way with the same amount of irrigation or fertilization.

Furthermore,

- k. Intercropping is a common and widely adopted practice in olive and pistachio orchards at the early stages of growth.
- l. Growing intercrops like chickpeas and lentils also helps suppress weed growth.
- m. Legumes can fix atmospheric nitrogen, so they have a reduced requirement for nitrogen from fertilizers.

General technical instructions for intercropping interventions

The recommended crops for an intercropping agricultural system are diverse based on the following two cases:



Case 1: Unavailability / scarcity of water resources for supplementary irrigation

The recommended crops in these areas are:

- *Winter legume crops such as: fava beans, peas, lentils, vetch and winter chickpeas.*
- *Cultivation of local varieties which are characterized by a low requirement for supplementary irrigation.*

In these areas, farmers should avoid intercropping with the following crops:

- *All summer vegetable crops, which need high quantities of supplementary irrigation.*
- *All crops that are harvested after May (such as wheat and barley) to avoid competition between these crops and trees regarding the available water and soil nutrients.*



Case 2: Water resources are available for supplementary irrigation

The recommended crops in these areas are:

- *Winter legumes such as fava beans, peas, lentils, vetch and winter chickpeas.*
- *Summer vegetables such as beans, cowpea and okra, and winter vegetables such as radish, cauliflower, cabbage, and spinach.*

Farmers can follow one of the following different approaches to intercropping:

- **Mixed intercropping** – two or more crops are planted in a mix without a distinct row arrangement.
- **Row intercropping** – two or more crops are planted in distinct rows.
- **Relay intercropping** – two or more crops are grown at the same time as part of the lifecycle of each, i.e., a second crop is sown after the first crop has been well established but before it reaches its harvesting stage.
- **Strip intercropping** – growing two or more crops at the same time in separate strips wide enough apart for independent cultivation.



Cultivation of two or more crops simultaneously on the same field to produce a greater yield on a given piece of land by making use of resources or ecological processes that would otherwise not be utilized by a single crop. (Photo: Ihsan for Relief and Development).

Advantages of intercropping agriculture systems	Disadvantages of intercropping agriculture systems
<ol style="list-style-type: none"> 1. Potential increased crop yields per unit area. 2. Improved soil fertility through the cultivation of leguminous intercrops e.g., nitrogen fixing. 3. Reduced soil erosion. 4. Lowered soil surface evaporation. 5. Reduced weed infestation (Mthembu et al., 2018: 363). 	<ol style="list-style-type: none"> 1. Intercropping is not always suited to a mechanized farming system. 2. It is time-consuming: it requires more attention and thus increased intensive, expert management. 3. There is reduced efficiency in planting, weeding and harvesting which may add to the labour costs of these operations. 4. Good planning is very important and includes careful cultivar selection, proper spacing, etc.

Important instructions for intercropping in olive orchards

- Avoid the cultivation of all *Cucurbitaceae* species (cucumber, zucchini, etc.), and *Solanaceae* species (eggplant, potato, tomato, pepper, etc.), in addition to cotton and sunflower as these crops are alternate hosts for the infectious Verticillium wilt (fungal disease), which will infect and damage olive trees.
- Avoid the competition for water and nutrients between olive trees and crops that affect the production of both crops (i.e., trees and crops planted between trees).
- Provide supplementary irrigation support and required fertilizers to avoid competition between the trees and field crops for nutrients and water.
- Avoid the farming of crops under a tree canopy.



Crop/vegetable selection – finding the best combination for your fields

The most common intercropping practiced at the moment is probably the cereal legume combination. Maize rows are interplanted with either beans or cowpeas. Farmers with a strong livestock component in their farming enterprise like to intercrop with maize and cowpeas but then the whole maize plant is to be grazed by livestock. A farmer in the North West province plants some fields like this every year to cater for his flock of sheep and some cattle in the dry winter months. This has been a great success. In his system the maize cobs are not harvested for human consumption but are left on the plants to be grazed.

The income works out very favorably since there are neither mechanization nor labour costs as essentially the animals ‘harvest’ their own food *in situ*.

Farmers should select crops which are compatible. This means they will work well side by side and will either mature at the same time or one crop will ‘wait’ whilst the other matures.



References and review

- i. *Food security and livelihoods (FSL) coordinator and co-coordinator, Cross-Border NW Syria (HLG) Food Security & Livelihoods Cluster Coordinated Response.*
- ii. *Agriculture and livestock working groups coordinators and co-coordinators.*
- iii. *FSL strategic advisory group (SAG) members.*
- iv. *Ihsan for Relief and Development experience in the intercropping system.*

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