Food and Agriculture Organization of the United Nations

# Zero /minimum tillage in rice-wheat system in Nepal


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| **Country of first practice** | Nepal |
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| **Sustainable Development Goals** | No poverty, zero hunger, and life on land |



## Summary

The objective of this practice is to facilitate timely planting of wheat crop, while minimizing soil degradation and conserving residual soil moisture and energy with minimum or zero tillage in wet and marshy land, where land preparation is not be possible.


## Description

By tradition, in the Terai region, farmers believe that wheat planting needs well-prepared and pulverized soil for high yields, carrying out several ploughings, and harrowing. However, after rice cultivation, land is marshy or wet and ploughing is not possible, delaying wheat planting. Zero or minimum tillage provides minimum disturbance of the soil by placing the seeds directly in furrows. Seeds are then covered with well-decomposed compost and rice stubbles left in the field. Some advantages of zero-tillage is the reduction of about 30 percent in the use of water, compared to conventional tillage, as well as an improvement in the physical properties of soil. In addition, by planting wheat in time, higher yields may be obtained.

### 1. Implementation of the technology

Land should be moist at the time of planting wheat under zero tillage, so that the seed drill can be operated under unploughed land after the rice harvest. Farm yard manure (FYM) should be spread in the field at 5 tonne per ha with rice stubbles left in the field after the paddy harvest. An improved seed cum fertilizer drill attached with a roller and tines is run by a power tiller to plant five to six rows of wheat at a time. Seeds and fertilizers are kept in advance in separate boxes which will be dropped through separate holes fitted with plastic pipes. The tines fitted in the seed cum fertilizer drill at a recommended row to row spacing. This will simply scrap the land making a 2 to 3 cm furrow, remove weeds, and drop the fertilizer and seeds simultaneously.

The holes for dropping fertilizer and seeds are calibrated in advance based on their recommended rates. This causes minimal disturbance to the soil and surface residues in the soil with a small furrow opening for seed and fertilizer placement. Wheat planting is normally done in early November. Wheat seeds can be planted as a relay crop under this condition.

The recommended seed rate is 120 kg per ha, and the fertilizer dosage is 100: 50: 25 kg NPK per ha. Only Di-ammonium Phosphate (DAP) is applied at the time of sowing seeds. Urea and potassium fertilizers are applied 10 to 20 days after sowing. The no-tillage in wheat is economical and produces comparable yields



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with conventionally ploughed land and uses only three quarters of the ploughing effort. The zero-tillage method reduces production costs, reverses soil degradation in intensive cropping systems and increases agro-ecosystem productivity.

Figure 1. Zero / minimum tillage in rice-wheat system in Nepal

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Zero tillage has also a positive impact on the resilience of agro systems and farmers´ livelihoods. The improvement of soil conditions and structure, and the protection offered by the cover crops makes it more resistant against water deficits from droughts and water saturation from heavy rainfall. The crop yield increase and the lower labour requirements benefit farmers, who can save money and time, improve their food security and explore market possibilities thanks to higher yields.

Figure 2. Zero / minimum tillage in rice-wheat system in Nepal

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These tillage practices enhance the resilience of farmers´ livelihoods when they adopt them. Soils increase their productivity and their resistance against natural hazards. Farmers can benefit from the yield improvement in their nutritional status and open business opportunities to increase their income.

**2. Technical, economic, financial, social and environmental attributes of the technology**

- Increases efficiency of farm inputs use.
- Timely cultivation possible under marshy wet land.
- Improves utilization of residual soil moisture after rice.
- Increases farm production.
- Reduces soil degradations.
- Reduces cost of cultivation.
- Helps to improve livelihood´s resilience against climate related risks.

**3. Minimum requirements for the successful implementation of the practice**

- Timely planting
- Low cost of production
- Resource conservation under intensive system.

**4. Agro-ecological zones**

- Subtropics, warm/mod cool

**5. Objectives fulfilled by the project**

**5.1 Labour-saving technology (LST)**

This practice helps in reducing ploughing efforts.



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