



Kiwi fruit cultivation

Nepal: किवी (ठेकी) फल खेति

Kiwi fruit cultivation on sloping land in the mid-hill areas of Nepal can help prevent soil erosion and is a sustainable land management practice. This high value crop introduces biodiversity and improves livelihoods by providing a source of cash income.

The kiwi fruit is native to China. Previously called Chinese gooseberry, it is now more commonly known by its marketing name of kiwi fruit. Kiwi fruits grow on large vines that are similar to grapevines in their general growth and fruiting habits as well as their training and trellising requirements. The fruit normally ripens within 25 weeks after the flowers first appear. The fruits range in weight from 40 to 90 g and can be picked shortly after the first frost in autumn; after that, they can be kept in cold storage for 4–6 months at °C. Kiwi vines can be grown on a wide range of soil types at elevations ranging from 1000 m to 2500 m. The kiwi plant is dioecious, meaning individual plants are either male or female. Only female plants bear fruit, but only when pollinated by a male plant. Vines of both sexes are essential for fruit production, and they must flower at the same time to ensure pollination. One male pollinator vine is required for eight female vines. The vines are commonly supported on sturdy structures strong enough to bear the heavy fruit, which might otherwise break the rather weak vines. T-bars or hitching post trellises are recommended to support the large fruiting area in the form of a canopy and provide easy access to the fruit.

Seedlings can be planted in the spring as soon as there is little chance of frost. Vines need to be pruned both in summer and in winter to maintain a balance between kiwi plant growth and profitable fruit production. Excessive plant growth is removed during the growing season to keep the kiwi canopy open and to remove non-fruiting wood. Harvesting can begin from the end of November. Frequent weeding is required to reduce competition for moisture and fertilizer. Kiwi fruit requires abundant water; during the dry season the newly planted kiwi vines need deep watering once a week.

Left: A kiwi orchard. The large kiwi vines grow best when they are supported off the ground; the trellises also make it easier for farmers to pick the fruits when they are ripe. Note the trellis T-bar supports. (Samden Sherpa)

Right: Kiwi plants with fruit (Samden Sherpa)



WOCAT database reference: QT NEP 30

Location: ICIMOD Knowledge Park at Godavari, Lalitpur District, Nepal.

Technology area: 1 ha

Conservation measure(s): Vegetative

Land Use: Perennial (non-woody) cropping

Stage of intervention: Mitigating land degradation

Origin: Introduced as an experiment (plant origin China)

Climate: Subhumid/temperate

Related approach: Not described

Compiled by: Samden Sherpa, ICIMOD

Date: April 2011, updated March 2013

The technology was documented using the WOCAT (www.wocat.org) tool.

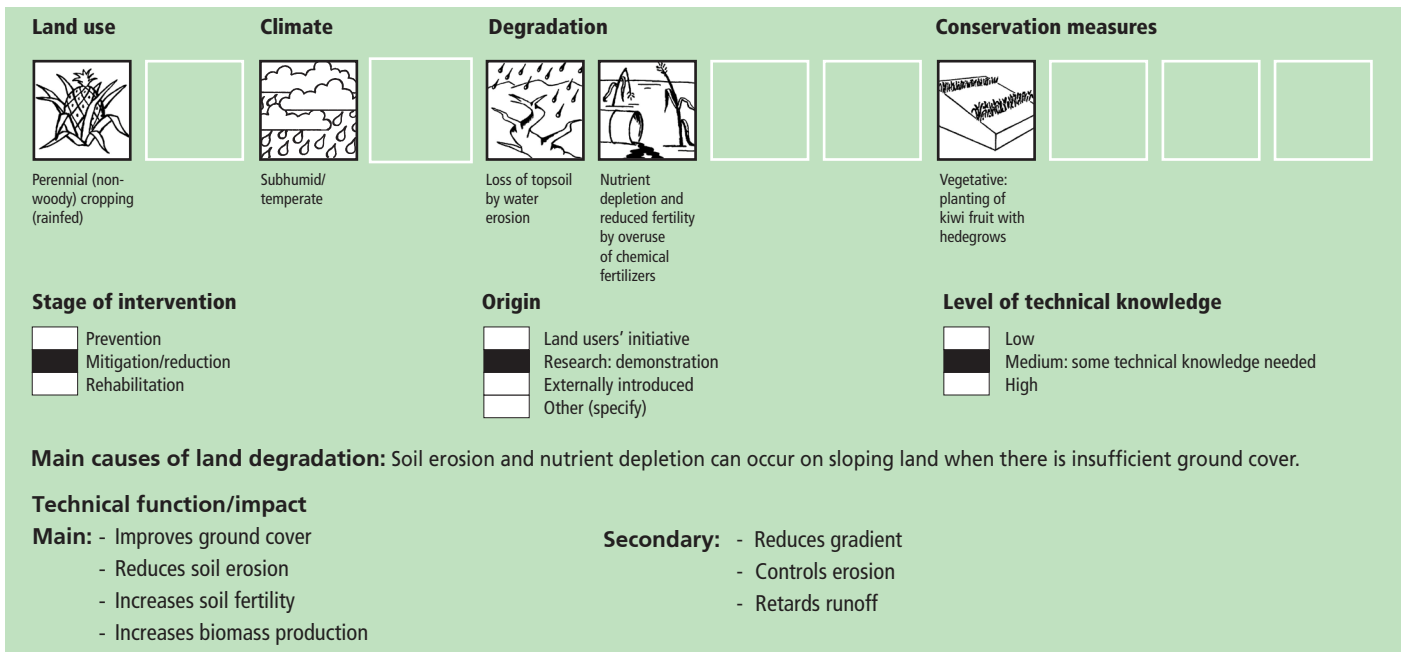
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Classification

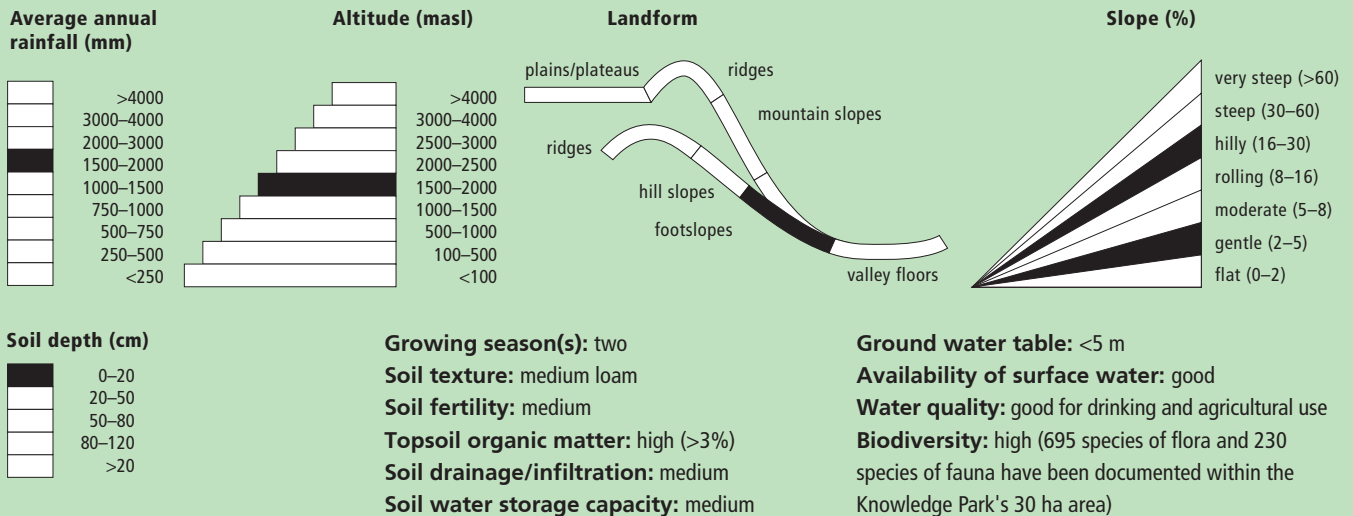
Land use problems

When sloping land is not used for agricultural production and not planted with ground cover or other vegetation (such as contour hedgerows), the fertile soil can be eroded and washed away by heavy monsoon rains.



Environment

Natural environment

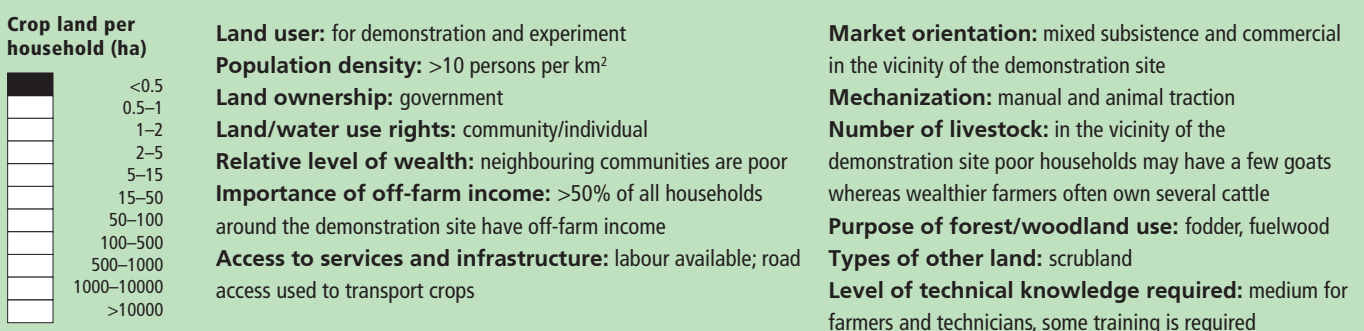


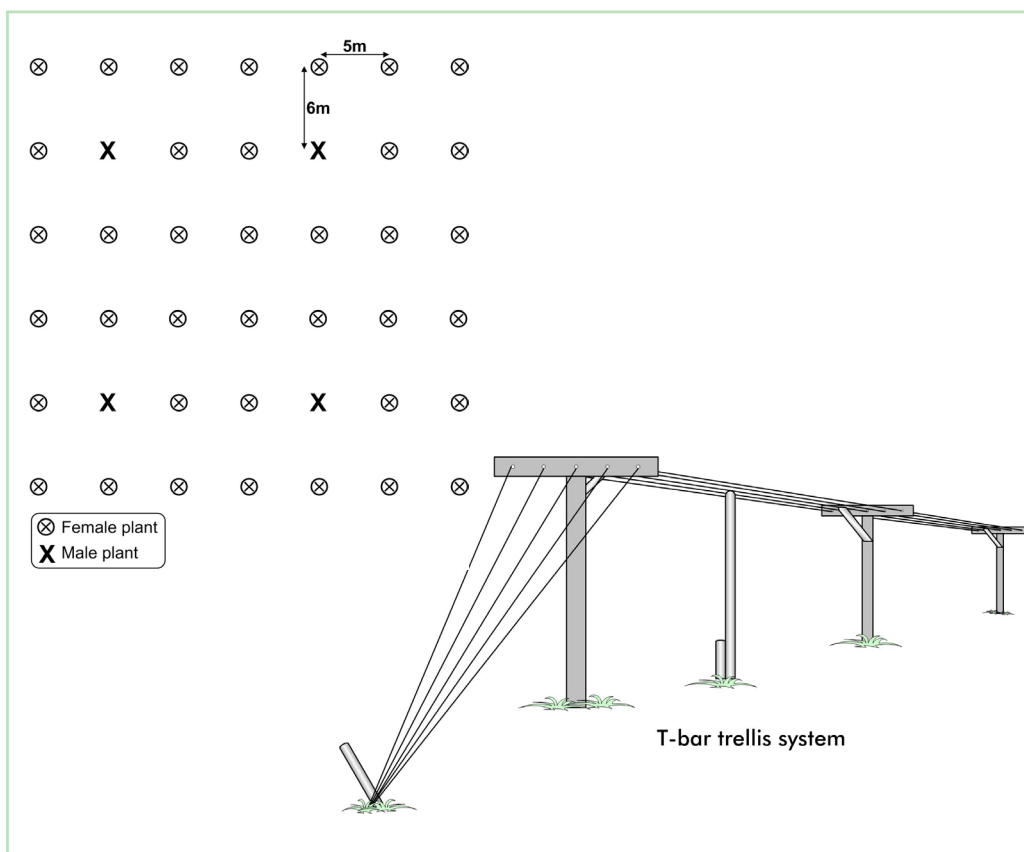
Tolerant of climatic extremes: mild winter frost and heavy rainfall events

Sensitive to climatic extremes: sustained heat spells, strong winds, hail and dust storms; seedlings are susceptible to drought

If sensitive, what modifications were made/are possible: a net canopy can be used to protect the vines from hail storms and help prevent fruit from dropping prematurely

Human environment





Establishing a kiwi orchard

Above: Layout of a kiwi orchard. The ideal density of kiwi plants in an orchard is 300 per ha, or in terms of the units of measure commonly used in Nepal, 15 plants per ropani. The plants are spaced 6 m apart and the distance between the rows is 5 m, with a male to female plant ratio of 1:8.

Below: T-bars are used as trellis supports for the kiwi vines. The T-bars are 2.5–3 m long iron posts that are anchored into the ground; they extend approximately 1.8 m above the ground and 60–70 cm deep into the soil. The arms of the T-bar extend 1–1.2 m. The bars are spaced approximately 4.5 m apart with galvanized wire strung between them and pulled taught to form the trellis itself. The end posts are braced by 4–5 wires that are secured into the ground (as shown). The kiwi plants should be at least 0.6 m away from the T-bars. The centre wire supports the main cordons, and the outer wires support the fruiting lateral parts. (AK Thaku)

Implementation activities, inputs and costs

Establishment activities

Vegetative:

- The plot where the vines are to be planted is prepared by clearing and weeding.
- The seedling pits are prepared at least 2 months before planting. Typically the pits are 1 m x 1 m and 1 m deep. The pits are filled with compost (30 kg per pit) and covered with soil to a height of 0.3 m above the ground.
- Seedlings are planted in the winter to the same depth as in the nursery; they are planted 6 m apart in rows spaced 5 m apart.
- The plants are pruned back to single, healthy shoots 15–30 cm high.

Structural:

Details of the T-bar trellises are given in the diagram.

Establishment inputs and costs per ha (average)

| Inputs | Cost (USD) | % met by land user |
|---------------------------|-------------|--------------------|
| Labour (136 person days) | 500 | |
| Equipment | | |
| – Iron poles | 3500 | |
| Materials | | |
| – Planting materials | 1500 | |
| Agricultural | | |
| – Compost/farmyard manure | 150 | |
| TOTAL | 5650 | 0% |

Maintenance/recurrent activities

- Permanent sod is maintained between the plant rows. Frequent weeding is required especially during the rainy season.
- Both summer and winter pruning is required.
- Cuttings from branches that fruited during the previous season (typically less than a pencil width in thickness) are collected during the winter pruning for propagation.
- Overhead sprinkler irrigation is used for commercial kiwi production.
- Kiwi vines are fertilized with manure in the early spring

Maintenance/recurrent inputs and costs per ha per year*

| Inputs | Cost (USD) | % met by land user |
|--------------------------|-------------|--------------------|
| Labour (122 person days) | 450 | |
| Equipment | | |
| – Secateurs | 50 | |
| Materials | | |
| – Binding wire | 650 | |
| Agricultural | | |
| – Compost | 150 | |
| TOTAL | 1300 | 0% |

Remarks:

- *The above establishment cost is for a plantation of 300 plants on one hectare; the recurrent annual maintenance cost has been calculated for a plantation of 300 plants per ha per year. All costs are estimated based on experience gained at the ICIMOD Knowledge Park at Godavari.
- All costs and amounts are rough estimates by the technicians and authors. Exchange rate USD 1 = NPR 71 in April 2011

Assessment

Impacts of the technology

Production and socioeconomic benefits

- + + + Reduced downstream flooding
- + + + Improved buffering/infiltration capacity

Socio-cultural benefits

- + + + Strengthened community institution; increased income
- + + + Improved knowledge of land management with kiwi fruit cultivation

Ecological benefits

- + + + Improved ground cover
- + + + More efficient use of land
- + + + Reduced soil erosion
- + + + Mixed farming (enhanced biodiversity)
- + + + Pollen for bees

Off-site benefit

- + + + Reduced soil erosion
- + + + Increase biomass production

Contribution to human wellbeing/livelihood

- + + + Kiwi production can be a good source of cash income as it is a high value crop. Kiwi fruit is high in nutrients, eating kiwis has been show to boost the immune system, to help regulate blood pressure, and to be beneficial for cardiac patients.

Production and socioeconomic disadvantages

- - - Increased demand for irrigation

Socio-cultural disadvantages

- - - Kiwi fruit is considered an elite fruit and it is usually too expensive for local consumption

Ecological disadvantages

- - - Increased competition with other plants for water, nutrients, and sunlight when intercropping

Off-site disadvantages

- none

Benefits/costs according to the land user

The approximate annual income from kiwi production is USD 11,765/ha/year. The technology provides on-farm employment opportunities for both men and women.

Benefits compared with costs

| | short-term | long-term |
|-----------------------|-------------------|---------------|
| Establishment | positive | very positive |
| Maintenance/recurrent | slightly positive | very positive |

Acceptance/adoption:

Kiwi fruit is gaining in popularity in Nepal; at present it is cultivated commercially by farmers in Kavre, Lalitpur, Dolakha, and Ilam Districts as well as in the Kathmandu Valley. The technology is widely accepted. Kiwi saplings were initially supplied by ICIMOD and by a private nursery in Kavre District.

Driver for adoption:

- Increased market demand for kiwi fruit
- A good alternative for sloping land management
- Kiwi cultivation is a source of income generation

Constraints

- It has been difficult to meet the high demand for kiwi seedlings. The scarcity of seedlings is the main bottleneck limiting the uptake of kiwi production.

Concluding statements

Strengths and →how to sustain/improve

Orchards are easy to establish and farmers can readily learn what is needed for kiwi cultivation → Awareness and training programmes can help farmers quickly learn what is needed for kiwi cultivation.

The benefits of the technology are easy to observe; farmers generate cash income from selling kiwi fruit, juice, and jam. → Awareness and training programmes can help farmers quickly learn what is needed for kiwi cultivation and postharvest processing.

Soil erosion is decreased due to increased groundcover. → Awareness and training programmes can help farmers quickly learn what is needed for kiwi cultivation.

Kiwi cultivation provides on-farm employment opportunities. → Awareness and training programmes can help farmers quickly learn what is needed for kiwi cultivation.

Weaknesses and →how to overcome

The initial costs associated with establishing the orchard may be a little expensive for many farmers, these include the purchase of: T-bar trellises, seedlings, iron rods, and wire. → Begin by using locally available materials such as bamboo poles to make T-bar trellis.

Key reference(s): Himelrick, DG; Powell, A (1998) *Kiwi fruit production guide*. Tuscaloosa, Alabama, United States: Alabama University <http://www.aces.edu/pubs/docs/A/ANR-1084/ANR-1084.pdf> (accessed 11 November 2012)

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