Title (Name of Technology)

Cultivation of cold tolerant chickpea varieties as a source increasing land and water productivity and improving soil heath

Country –

Kamashi and Tashkent districts, Uzbekistan

Definition (2.1.1)

Continuous cultivation of cereals on rainfed lands draws out heavily on soil nutients leaving soil impoverished. Cultivation of chickpea planted in spring after winter has been an option for rainfed lands. However, lesser than optimum rainfall in spring can cause failure of chickpea crop. The availability of cold tolerant chickpea varieties allows planting of chickpea in autumn. Such a crop germinates and establishes prior to winter by utilizing autumn precipitation and makes use of moisture created by snow. Such autumn planted crop completes its life cycle before onset of heat in late spring, thus giving higher productivity, Chickpea being a leguminous crop fixes atmospheric nitrogen in soil, thus improving soil health.

Description

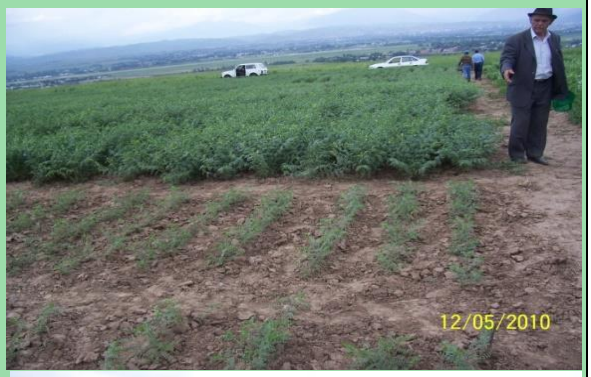
The farmers in Central Asia have traditionally practiced chickpea planting in early spring after winter. Depending on soil conditions after snow melting it could take farmers up to a month for soil drying for land preparation and planting. Chickpea planted under such conditions flowers under high temperature which negatively affects floral fertilization and seed set. Traditionally, the farmers couldn't plant chickpea before onset of winter for a lack of cold tolerant varieties.

In the past 10 years a number of cold tolerant chickpea varieties selected from ICARDA's international nurseries constituting cold tolerant chickpea lines were released in Central Asia countries. Consequently, it is now possible for planting chickpea before onset of winter. The new cold tolerant varieties are also resistant to prevalent diseases. While autumn planting of chickpea can be done both under irrigated and rainfed conditions, the technology is particularly targeted for rainfed condition due to precipitation insufficient to support successful cultivation on cereals. Chickpea by adaptation is a rainfed crop.

Autumn planted chickpea could yield up to 50% higher than spring planted crops. The yield advantage primarily comes from utilization of winter rain for crop growth, and avoidance of terminal heat during maturity.

Cultivation of chickpea is not only economically profitable but also for improving soil health. There are nodules forming bacteria in chickpea roots that promotes fixation of atmospheric nitrogen to the soil. Thus, the requirement of nitrogenous fertilizers is lesser for chickpea cultivation comparing to cereal crops. Previous studies have shown that organic matter content of soil is improved through cultivation of chickpea which improves soil health.

Picture or Illustration of the technology



Location: Top: Hissor, Tajikistan, Middle and bottom: Kamashi, Uzbekistan

Technology area: 200 ha

Stage of intervention: alleviation / reduction of land degradation, management of fertility regime.
Main

Land use problems and main causes of land degradation:

Cultivation of winter cereal crops causes extraction of soil organic matter and soil nutrient, which renders soil unproductivity. Continuation of this cropping practice leaves soil impoverished, leading to degradation and unsuitable for crop production.

Main technical functions:

Cultivation of chickpea allows in replenishing soil organic matter and fertility caused atmospheric nitrogen fixation into the soil by the symbiotic bacteria present in nodules on the roots. Cultivation of chickpea in crop rotation will keep soil from degradation. Growing chickpea over a period of time could help revive health of degraded soil.

Land use	Conservation measures
Rainfed land Cultivation of cereals crops	Agronomic measures: Cultivation of chickpea either by replacing winter cereals or by including in alternate year crop rotation

Environment

Natural environment	Human environment
Average annual rainfall: less than 300 mm **Altitude (m a.s.l.): 375** **Landform:** **Slope (%):** **Soil fertility:** **Topsoil organic matter:** **Soil drainage/infiltration:**	**Size of land per household (ha)**: **Land user:** **Land ownership:** **Land/water use rights:** **Market orientation**:

Assessment

Impacts of the Technology

Major benefits:

1. Adds nitrogen in soil and improved organic matter content of soil.
2. Utilizes autumn rain and soil moisture created by melting snow
3. Matures earlier than spring planted crop thereby avoids heat during grain filling
4. Chickpea has higher market price than traditionally grown cereals on rainfed lands.

Major disadvantages:

1. Area under cereal will decrease thereby creating a need for wheat purchase equal to amount being produced on rainfed land

Acceptance/adoption: (3.3)

Already accepted practice by the farmers in Kamashi district in Uzbekistan and Bobojon Gafurov and Hissor districts in Tajikistan

Reference(s): Full citation of a book, article, report, internet, or even personal communication and indigenous knowledge

Amanov S, Akramkhanov A, and Sharma R. 2019. A)Climate-resilient food legumes for higher and sustainable productivity of rain-fed crop lands in Central Asia. https://repo.mel.cgiar.org/handle/20.500.11766/9844

Sharma RC, Amanov A, and Amanov O. 2019. Climate Resilient Varieties of Cereals and Legumes for Uzbekistan. Oral paper presented at 'INNOWEEK' organized by the Uzbekistan Ministry of Innovative Development, October 22-26 October 2018, Tashkent. https://www.dropbox.com/s/mye9xrlxhewulu8/Ram%20Sharma_Tashkent_24%20October%202018.pdf?dl=0

Chickpea: an alternative crop for rainfed land in Uzbekistan. 2019.
https://www.youtube.com/watch?v=Duh6pEjJZxk&t=2s

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