

After SWC: second year maintaining sainfoin (Abdybek Asanaliev (Bishkek, Kyrgyz Republic))

# Cultivation of sainfoin on high mountain pastures – Suusamyr Valley (in the frame of CACILM) (Kyrgyzstan)

Kyrgyzstan - Central Asian Countries Initiative for Land Management (САСІLМ/ИСЦАУЗР)

# DESCRIPTION

Conservation of soil fertility through the cultivation of sainfoin (perennial legume plants)

The Suusamyr Plain is located in the South-West of Chui Valley. Generally, this zone, located at 2000-3800 meters above sea level is used by farmers as summer pastures. Farmers are practicing agro-pastoralism by grazing animals and at the same time producing winter fodder for their livestock. They cultivate mainly barley and sometimes perennial grass. The territory of the local administration of the Aiyl Okrug "Suusamyr" includes 6645 hectares of arable land. In 2009 about 2500 hectares were cultivated with cereals (including 1950 ha of barley) and 250 ha with sainfoin. As a result of the monoculture of cereals, weeds, pests, and insects accumulate on the fields and the soil fertility is declining. These are direct and indirect indicators of soil degradation

indirect indicators of soil degradation. The main cultivated perennial legume is sainfoin. However, farmers are short of sainfoin seeds. Most of them cultivate sainfoin for hay making and consider the seed production as

non profitable.

Fallow is maintained free from weed during the vegetation season. As fallow is weed free and accumulates the soil moisture it has synergy effect to harvest high yield of barley grain. This fallow is kept during one vegetation season and applied by other farmers during next season. Crop rotation cycle is 5 years including 1 year-fallow period (1year-fallow period, 1year for barley planting and 3 years for sainfoin planting). Barley is planted into the fallow. Sainfoin improves the soil structure as a result of high rizo-biomasses (237-333 kg/ha). Sainfoin is able to accumulate 194 -178 kg/ha of biological nitrogen providing sufficient nitrogen fertilization for two consecutive cropping seasons. Sainfoin is a high nectar producting crop, allowing farmers to produce 150 kg of honey from 1 hectare of sainfoin during a vegetation period. As the result of insect pollination, an increase in seed production of between 100 and 200 kg/ha has been observed.

Purpose of the Technology: Soil fertility conservation through crop rotation of barley with the perennial grass sainfoin (Onobrichis sativa).

Farmer Ibraimov Azimjan has 25 hectares of private land and rents other land from neighboring farmers. UNDP's project procured seeds of sainfoin and covered expenditures for tillage and planting. The farmer's responsibility is to distribute produced seeds among other farmers which are able to expand their areas under sainfoin cultivation. The farmers maintains crop rotation.

Fields are located in the foothills at an elevation of 2038-2200 m above sea level. Plowing is conducted along the slope. But planting is done across to the tilling direction, horizontally along the field (contour planting drilling). This technology increases vegetation cover and after harvesting stubbles remain

Agriculture in Suusamyr Valley is based on animal husbandry which is kept on pastures during Agriculture in Suusamyr Valley is based on animal husbandry which is kept on pastures during three seasons (spring, summer and autumn). But farmers practice agro-pastorals. They have private arable land and produce cereals and forage crops. The Local Government "Suusamyr" has 6645 hectares of arable land including 561 hectares from the Distribution Found (state regulated land). Farmers are not subsidized by the Government. The farmer lbraimov Azimjan has 25 hectares of private land and rents other land from the neighboring farmers. In 2009 UNDP's project procured basic seeds of sainfoin and covered the expenditures for tillage and planting. UNDP's project organized several workshops for farmers support in field inspection of sainfoin seed and barley. Farmer's responsibility is to distribute seed among other farmers which able to expand their areas under sainfoin. Farmer has resources to guard the field from grazing of animals during

#### I OCATION



Location: Jayl district, Kyrgyz Republic, Chui oblast, Kyrgyzstan

No. of Technology sites analysed:

Geo-reference of selected sites 73.9167, 42.2167

**Spread of the Technology:** evenly spread over an area (approx. 0.1-1 km2)

Date of implementation: less than 10 years ago (recently)

# Type of introduction

through land users' innovation as part of a traditional system (> 50 years) during experiments/ research

through projects/ external interventions

the vegetation period, harvest and transportation of seed. Azimjan also organized the seed cleaning and storage. Project's management developed the rules on seed distributions and sale.

The farmer should produce sainfoin and barley in order to get benefit. Farmer's responsibility is to distribute seed to other farmers which able to expand the area under sainfoin and barley. Name of sainfoin variety is "Belek", barley variety is "Kylym", they are developed in research centers of Kyrgyz Republic.

The population of the Aiyl Okrug "Suusamyr" is 6400. The Local Government has no human resources for field activities. There are six villages at the territory of this Local Government. All fields and villages are connected by dirt roads. The electricity is supplied on regularly basis. People have drinking water supplies. Farmer's fields are located at foothills of 2038-2200 m above sea level. The type of land use is rainfed. Some irrigated channels which were developed in Soviet time are destroyed now. The fields are infested mainly with wild Oat, Couch-grass, spp. pigweed, wormwood and others. The farmer's cultivate cereals as monoculture. Some of them plant the sainfoin. Additionally, farmers cultivate potato on a total area of 180-200 hectares. The varieties are from local breeders (Nevsky, Cardinal) and introduced varieties from seed Firm "Agrico" and "NZPC" (Picasso, Sante and Mondial).

The main type of soil is chestnut (light chestnut soil and dark chestnut soil). The potential fertility of these soils is high but due to the lack of crop rotation, plant protection activities, fertilizer application, soil degradation is going on. There are no soil maps in the office of local administration except for those which were developed during the Soviet time.



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Before SWC: before cultivation of crops the field has not been tillage more than 10 year (Azimjan Ibraimov (Bishkek, Kyrgyz Republic))

# CLASSIFICATION OF THE TECHNOLOGY

#### Main purpose

- improve production
  - reduce, prevent, restore land degradation conserve ecosystem
- protect a watershed/ downstream areas in combination with
  - other Technologies
  - preserve/ improve biodiversity reduce risk of disasters
  - adapt to climate change/ extremes and its impacts
  - mitigate climate change and its impacts
- create beneficial economic impact

Purpose related to land degradation

restore/ rehabilitate severely degraded land

prevent land degradation

adapt to land degradation

reduce land degradation

not applicable

create beneficial social impact

# Land use



Cropland - Annual cropping, Perennial (non-woody) cropping



**Grazing land** - Extensive grazing land: Semi-nomadism/ pastoralism, Ranching Intensive grazing/ fodder production: Improved pastures other (specify): agro-pastoralism

# Water supply

rainfedmixed rainfed-irrigatedfull irrigation

Number of growing seasons per year: 1 Land use before implementation of the Technology: n.a. Livestock density: 25-50 LU /km2

#### Degradation addressed



**chemical soil deterioration** - Cn: fertility decline and reduced organic matter content (not caused by erosion)



**biological degradation** - Bc: reduction of vegetation cover, Bh: loss of habitats

### SLM measures



agronomic measures - A1: Vegetation/ soil cover, A3: Soil surface treatment



**vegetative measures** - V2: Grasses and perennial herbaceous plants

SLM group

• n.a.

 $\checkmark$ 

✓

# TECHNICAL DRAWING

Technical specifications

louting + compacting East 8-10%-North Square=24 hectare South 350M de. 687 M West

Author: Azimjan Ibraimov, Suusamyr Village

Fields are located on South exposition of the foothills of the Kyrgyz Ala-Too Mountains in the Northern part of the Suusamyr valley. The length of the sainfoin field is 687 meters, and its width is 350 meters. Slope steepness is 8-10 %.

Tilling is conducted along the slope by a tractor K-700, with harrowing being conducted at the same time. The depth of tilling is 20-22 cm. Planting is conducted across to plowing direction. The date for sainfoin sowing is the first ten days of May. The seeds required are 80 kg/ha. Depth of sowing is 4 cm. This field is situated 8 kilometers from central Suusamyr village, reachable on a bad dirt road.

Location: Suusamyr Valley. Jaiyl raion / Chui oblast / Kyrgyzstan Date: 11.01.2011

Technical knowledge required for field staff / advisors: high (Special training is requested) Technical knowledge required for land users: low (Field demonstration is needed) Main technical functions: control of dispersed runoff: impede / retard, stabilisation of soil (eg by tree roots against land slides), increase in organic matter, increase in nutrient availability (supply, recycling,...) Secondary technical functions: improvement of subsoil structure (hardpan)

Vegetative measure: field planted by perennual grass Vegetative material: C : perennial crops Number of plants per (ha): 3000000 Spacing between rows / strips / blocks (m): 0.15 Width within rows / strips / blocks (m): 0.15 Vegetative measure: Vegetative material: C : perennial crops

Perennial crops species: Sainfoin os sowed with planting machine C3-3.6. The distance between colters is 15 cm.

# ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

# Calculation of inputs and costs

- Costs are calculated:
- Currency used for cost calculation: **KGS**
- Exchange rate (to USD): 1 USD = 45.0 KGS
- Average wage cost of hired labour per day: 8.00

# Most important factors affecting the costs

The price of sainfoin seeds is very high. The slope is increasing the fuel consumption of the tractor, and prices for fuel are raising. Contour tilling (also planting) by big tractor (K-700) is further increasing fuel consumption, because the number of turning-points are increased. Soil depth is not increasing cost in a major way, because soil structure in the area is comparatively good and the tractor is powerful. All costs are calculated for 1 hectare of sainfoin.

## Establishment activities

1. Tilling (Timing/ frequency: End of April. Once in 3 years)

2. Planting (Timing/ frequency: End of April. Once in 3 years)

## Establishment inputs and costs

| Specify input                                   | Unit        | Quantity | Costs per Unit<br>(KGS) | Total costs<br>per input<br>(KGS) | % of costs<br>borne by land<br>users |  |  |  |  |
|---|-------------|----------|-------------------------|-----------------------------------|--------------------------------------|--|--|--|--|
| Labour  |             |          |                         |                                   |                                      |  |  |  |  |
| establishment costs                             | hectare     | 1.0      | 187.0                   | 187.0                             |                                      |  |  |  |  |
| labour  | person/hour | 0.8      | 128.0                   | 102.4                             | 100.0                                |  |  |  |  |
| Plant material                                  |             |          |                         |                                   |                                      |  |  |  |  |
| seeds   | hecatre     | 1.0      | 108.0                   | 108.0                             |                                      |  |  |  |  |
| seeds   | kg          | 75.0     | 2600.0                  | 195000.0                          |                                      |  |  |  |  |
| Other   |             |          |                         |                                   |                                      |  |  |  |  |
| fuel  | liter       | 58.0     | 321.0                   | 18618.0                           |                                      |  |  |  |  |
| Total costs for establishment of the Technology | 214'015.4   |          |                         |                                   |                                      |  |  |  |  |

### Maintenance activities

1. Harvesting (Timing/ frequency: annually)

- 2. Cleaning of seed (Timing/ frequency: annually)
- 3. Cleaning of seed (Timing/ frequency: None)

# NATURAL ENVIRONMENT



|   |   | rich<br>✓ very ri   | ch  |   |  |
|---|---|---|---|---|--|
| Sedentary or nomadic<br>Sedentary<br>Semi-nomadic<br>Nomadic  | Individuals or groups<br>individual/ household<br>groups/ community<br>cooperative<br>employee (company,<br>government) | Gender<br>V wome<br>V men   | n   | Age<br>children<br>youth<br>middle-aged<br>elderly  |  |
| Area used per household<br>< 0.5 ha<br>0.5-1 ha<br>1-2 ha<br>2-5 ha<br>✓ 5-15 ha<br>✓ 15-50 ha<br>50-100 ha<br>100-500 ha<br>500-1,000 ha<br>1,000-10,000 ha<br>> 10,000 ha   | Scale<br>small-scale<br>medium-scale<br>large-scale   | Land ownership<br>state<br>company<br>communal/village<br>group<br>individual, not titled<br>individual, titled |   | Land use rights<br>open access (unorganized)<br>communal (organized)<br>leased<br>✓ individual<br>Water use rights<br>open access (unorganized)<br>✓ communal (organized)<br>leased<br>individual |  |
| Access to services and infrastruct<br>health<br>education<br>technical assistance<br>employment (e.g. off-farm)<br>markets<br>energy<br>roads and transport<br>drinking water and sanitation<br>financial services<br>Extension Service | ture<br>poor v v v v v v v v v v v v v v v v v v  |   |   |   |  |
| IMPACTS   |   |   |   |   |  |
| Socio-economic impacts<br>Crop production   | decreased 🖉 🖌 🖌   | increased   | Quantity before SL<br>Quantity after SLM  | .M: 19 c/ha<br>1: 23 c/ha   |  |
| fodder production   | decreased   | increased   | Quantity before SLM: 500 bales  |   |  |
| fodder quality<br>expenses on agricultural inputs   | decreased    decreased  | increased<br>decreased  | Quantity before SLM: 550 bales<br>Quantity before SLM: 0<br>Quantity after SLM: 24 ha                     |   |  |
| diversity of income sources   | decreased 🖌 🖌   | increased   |   |   |  |
| Socio-cultural impacts<br>food security/ self-sufficiency<br>cultural opportunities (eg spiritual,<br>aesthetic, others)<br>community institutions  | reduced / /   | improved<br>improved<br>strengthened  | Quantity before SI  | _M: 0   |  |
| conflict mitigation worsened view improved  |   | improved  | Quantity after SLM: 1<br>Quantity before SLM: 0<br>Quantity after SLM: 2 training                         |   |  |
| Ecological impacts<br>surface runoff<br>soil cover<br>soil compaction<br>soil organic matter/ below ground (<br>habitat diversity   | increased / / / / / / / / / / / / / / / / / / /   | decreased<br>improved<br>reduced<br>increased<br>increased  | Quantity before SL<br>Quantity after SLM  | _M: 80%<br>1: 95%   |  |
| <b>Off-site impacts</b><br>buffering/ filtering capacity (by soil,<br>vegetation, wetlands)<br>damage on neighbours' fields   | increased   | improved<br>reduced   | Quantity before SI<br>Quantity after SLM<br>Project recruts a s<br>since May. And at<br>neighbours fields | M: None<br>1: 5ha<br>recurity guard to protect sainfoin field<br>the same time he watches the<br>Therefore damage on it is reduced  |  |

None None

| COST-BENEFIT ANALYSIS Benefits compared with establishment costs |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |
| very negative very positive                                      |  |  |  |  |  |  |  |
| e costs  |  |  |  |  |  |  |  |
| very negative  |  |  |  |  |  |  |  |
| very negative  |  |  |  |  |  |  |  |
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| not well at all 🚺 💙 👘 very well                                  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| not well at all 🖌 🗸 very well                                    |  |  |  |  |  |  |  |
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not well at all 🚽 🖌 very well

not well at all

not well at all 📕 🖌 📃 📃 very well

# Other climate-related consequences reduced growing period

# ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology

single cases/ experimental 1-10%

10-50% more than 50%

Has the Technology been modified recently to adapt to changing

- conditions?
- Ja Nee

drought

general (river) flood

# To which changing conditions?

- climatic change/ extremes
- changing markets
- labour availability (e.g. due to migration)

# CONCLUSIONS AND LESSONS LEARNT

# Strengths: land user's view

- Keeping the fields as fallow is not profitable for ordinary farmers. It can be done by rich farmers.
- There is need in subsidies from the Government in order to distribute cereals and perennial legume seed.
- If there is enough fuel and seed farmers can cultivate sainfoin everywhere, it is very good technology.

### Strengths: compiler's or other key resource person's view

- The winter is very hard in Suusamyr Valley and livestock need enough and quality forage. Sainfoin hay contains high level of protein.
- Natural vegetation yields for hay making is not so big particularly in drought period. Sainfoin is very productive crop.
- Rizo biomass of sainfoin is big and it accumulates the nitrogen. Sainfoin improves the soil fertility.
- Sainfoin is income generating crop because after harvesting of seed sainfoin the straw can be also sold by farmers at the price of 50 som for one hay bale
- This Technology also protects the soil surface from the erosion in the result of strong density of plants.

# Of all those who have adopted the Technology, how many have done so without receiving material incentives?

✓ 0-10%
 10-50%
 50-90%
 90-100%

# Weaknesses/ disadvantages/ risks: land user's viewhow to overcome

- Poor farmer is not interested in the Conservation Technology Awareness raising of the poor farmers is necessary
- We are having not enough knowledge about the soil conservation possibility legumes To organize the training of farmers.
- State legislation about soil protection is not maintained by Local Government and farmers To monitor the observation of legislation by land users and local authorities
- There should be Soil fertility protection service. The Government should finance the establishment of service on soil fertility protection.

# Weaknesses/ disadvantages/ risks: compiler's or other key resource person's viewhow to overcome

- Lack of good credit system for farmers SWCT. To lower interest rates of credits while lending farmers for implementation of the Conservation Technology
- Comparatively high price of certified sainfoin seeds are not available for farmers Usage of not certified seed by farmers leads to poor yields of sainfoin and cereals. To ensure the supply of high quality seed through distributers' centers
- Farmers need special knowledge in order to produce sainfoin seed To conduct trainings for farmers on seed production technologies.
- To consolidate farmers about the effect of sainfoin cultivation for soil fertility

some scientists have to do on farm demonstration plots Extension services should organize demonstration fields in villages.

# REFERENCES

Compiler

Abdybek Asanaliev

Editors

**Reviewer** Deborah Niggli Alexandra Gavilano

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### **Resource persons**

Azimjan Ibraimov - land user Baibek Usubaliev (b.usubaliev@up.elcat.kg) - land user Urmat Duishenaaly uulu - land user

# Full description in the WOCAT database

https://qcat.wocat.net/af/wocat/technologies/view/technologies\_963/

Linked SLM data

n.a.

# Documentation was faciliated by

Institution

• n.a.

Project

• Central Asian Countries Initiative for Land Management (CACILM I)

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