## Central Asia/ Agro-Pastoral

### Progress towards outputs (2 pages)

Summarize major successes in producing outputs; provide links to additional descriptions of these achievements. Refer to indicators from Table 1, as relevant.

Impact of soil conservation tillage on soil physical and chemical properties was compared for several fodder crops, including sorghum, Africa millet, maize, mung bean and pea.

The study confirmed that soil conservation is physical practice to get yield of the indicated crops for marginal farmers having limited funds to apply energy intensive high cost farming practices. Yield of the fodder crops was good under alternate furrow and zero slope furrow irrigation technologies.

At the same time:

* Soil compaction was noted under both, conventional tillage and direct sowing method; statistical proven soil compaction is indicated in both cases in the soil layer of 0-60 cm (Table 1).

Table 1. Soil bulk density change under direct sowing method

|  |  |  |
| --- | --- | --- |
| Depth, cm | Conventional tillage | Direct sowing |
|  | 11.04.2015 | 22.09.2015 | 11.04.2015 | 22.09.2015 |
| 0-20 | 1.47(.05) | 1.57(.01) | 1.56(0.03) | 1.65(.03) |
| 20-40 | 1.49(.07) | 1.56(.01) | 1.56(0.02) | 1.59(.01) |
| 40-60 | 1.48(.04) | 1.57(.03) | 1.50(0.07) | 1.58(.02) |
| 60-80 | 1.53(.03) | 1.58(.05) | 1.58(0.03) | 1.60(.03) |
| 80-100 | 1.60(.03) | 1.60(.01) | 1.62(.02) | 1.60(.02) |

This data confirms needs for applying mulching under zero tillage practices.

### Progress towards the achievement of research outcomes and IDOs (2 pages)

Farmer field day was organized at the project site with participation of 30 farmers. Knowledge were shared on irrigating fodder crops using alternate furrow irrigation and zero slope furrow irrigation. Advantages and potential risks were explained to the farmers.

### Progress towards Impact (1/2 page)

If/when relevant major contributions towards understanding impact and impact per se should be summarized, with a web link to more detailed documents.

The preliminary findings of the study indicate that to apply zero tillage practices:

soil has to have relatively high content of organic matter; initial soil bulk density to be low, 1.2-1.3 t/m3; soil moisture content has to be maintained above 50% of field capacity; this practice might be not applicable on heavy compacted soils of Karakalpakistan. However, further studies might be required by combination of zero tillage and mulching.

Soils of Karakalpakistan have low content of organic matter, compacted and that is why they can be easily compacted under zero tillage and furrow irrigation. In spite of this the study proved that zero tillage on irrigated land can be practiced and yields of summer crop obtained. Long term studies are required to demonstrate to farmers benefits of zero tillage.

### Unexpected Outputs, Outcomes and or Impact

Please summarise any unexpected outputs and outcomes that contributed to impact and progress towards IDOs and Impact. Please include links to relevant documents and research evidence.

Soil compaction was noted for both cases, conventional farming practices and conservation soil tillage. Zero tillage significantly increased soil bulk density from 1.55 to 1.68 t/m3 in 0-20 cm soil layer. In both cases, compaction was recorded in the layer of 0-60 cm. Pre-cropping season soil leaching allowed maintaining low soil salinity levels in the topsoil during cropping season under both, direct sowing and conventional practices.

**Estimating impact of zero tillage on water use efficiency at Gairatdin farm in Karayuziak district of Karakalpakistan**

1. Zero tillage increased soil bulk density from 1.55 to 1.68 t/m3 in the top 0-20 cm soil layer. During whole summer season soil bulk density was higher under zero tillage as compared to conventional soil tillage practices.
2. Because of pre-cropping season soil leaching soil salinity levels in the topsoil were low during cropping season under both, direct sowing and conventional practices.
3. Top soil bulk density

a)

b)

c)

Fig. 1 Impact of zero tillage on soil bulk density at 0-20 cm (a), 20-40 cm (b) and 40-60 cm(c)

1. Irrigation applications

Irrigation applications were higher under conventional irrigation practices as compared to zero tillage (Table 1).

Table 1. Irrigation applications under conventional and zero tillage

|  |  |  |  |
| --- | --- | --- | --- |
| Crop | Irrigation method | Zero tillage | Conventional tillage |
| Sorghum | Alternate furrow irrigation | 2674 | 2945 |
| Sorghum | Irrigation by zero slope furrows | 2774 | 2940 |
| Sorghum  | Conventional furrow irrigation |  | 1800 |
| Mungbean | Alternate furrow irrigation | 2093 | 2473 |
| Sunflower | Alternate furrow irrigation | 2877 | 2943 |

Irrigation applications were less under zero tillage as compared to conventional furrow irrigation.