

# A short-duration mungbean variety shows potential to sustain wheat-cotton rotation through soil improvement besides additional income and improved human nutrition in the Aral Sea Region

## Issue to address

Long-term adoption of traditional wheat-cotton rotation is unsustainable in the Aral Sea Region.

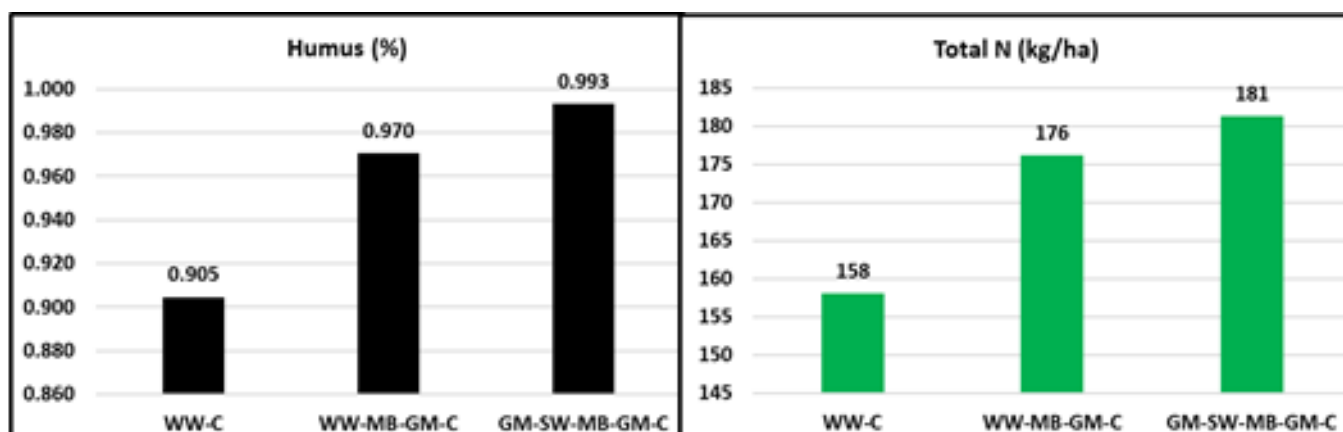
## Intervention

Grow a short duration mungbean variety (at present Durdona) after wheat harvest that can mature in the short fallow period in rotation after wheat harvest. Durdona mungbean maturing in 70 days allows it to compete crop growth between July and September.

After mungbean harvesting, winter-pea was planted as a green manure crop, the succulent pea crop dies with cold temperature but adds nutrients to the soil.

## Expected outputs

1. Economic return from fallow land between wheat and cotton crops (or also between two wheat crops).
2. Improvement in soil nitrogen and humus content which is accomplished by bacteria surviving in roots of mungbean plants. Such bacteria bring atmospheric nitrogen into soil.
3. More productive cotton crop following mungbean crop compared to the traditional practice of keeping land fallow.
4. A farmer producing mungbean will consume more of this nutritious food compared to a farmer not producing this crop but buying from the market.



**Figure 1.** Humus and total N content under three crop rotations in Khorezm province, Uzbekistan (WW-C: winter wheat-cotton; WW-MB-GM-C: winter wheat-mungbean-green manure-cotton; GM-SW-MB-GM-C: green manure-spring wheat-mungbean-green manure-cotton).



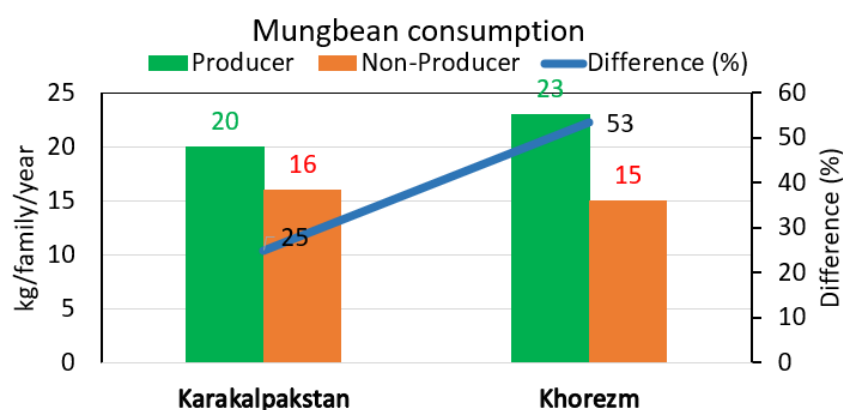
**Figure 2.** Growth of cotton crop under winter wheat-fallow-cotton rotation (left) and under winter wheat-mungbean-green manure-cotton rotation (right).

## Pre-requisite

Presence of soil moisture or irrigation at mungbean planting time after wheat harvest.

## Results

1. In 2022, Durdona mungbean planted in the Aral Sea Region in July matured in September and produced grain yield up to 1.7 t/ha. Mungbean grain is sold at a minimum price of one USD per kilogram whereas good quality mungbean seed is sold at 1.5 to 2.0 USD per kilogram depending on quality. So, within 3 months period farmers can earn substantial income by growing mungbean.
2. After growing mungbean and a short period winter pea crop, soil humus and nitrogen content was increased by up to 20% each. Average increase in humus and nitrogen contents over 5 farmers' fields are presented in Figure 1.
3. More robust cotton crop resulted on land cultivated with mungbean and pea compared to control (Figure 2).
4. On family basis mungbean producers consumed 25 and 53% higher mungbean grain than the non-producers in the two provinces (Figure 3).



**Figure 3.** Comparative analysis of mungbean consumed on family basis in mungbean producing and non-producing farm families in Karakalpakstan and Khorezm provinces in 2022.

## Outscaling in 2023

- Around forty farmers have planted Durdona mungbean in summer of 2023 on more than 100 ha in Karakalpakstan.
- Thirteen farmers have planted Durdona mungbean after wheat on around 50 ha in Khorezm.