

Global Programme Sustainability and Value Added in the Cotton Economy

Analysis of Water Footprint in Cotton Production in Maharashtra and Gujarat

India, 21 October, 2020



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Global Programme Sustainability and Value Added in the Cotton Economy

Commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ)

under the special Initiative of “One World - No Hunger” (SEWOH)

Duration: 04/2019 – 03/2023

Objective: Increased value added from sustainable cotton in our partner countries (India, Uzbekistan, Burkina Faso, Cameroon) by



Increasing sustainable cotton production



Strengthening of domestic supply chains for processing sustainable cotton



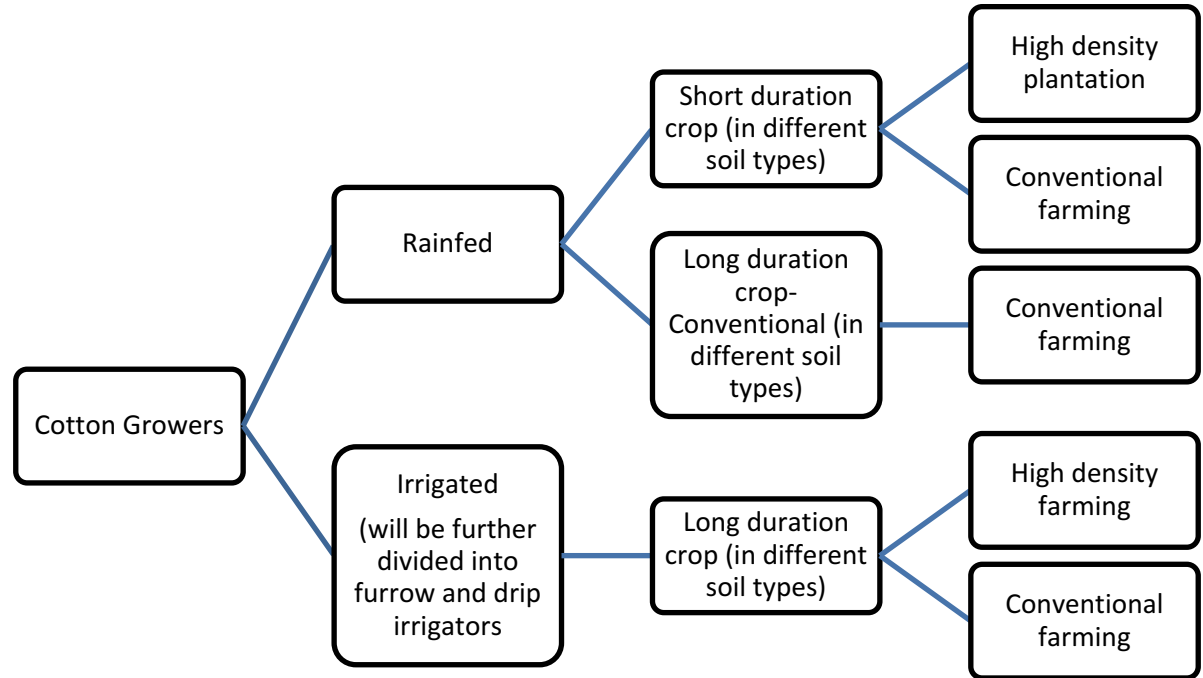
Study on Analysis of Water Footprint in Cotton Production in Maharashtra and Gujarat

Objectives:

- To map and compile a project baseline data on water footprint in cotton production in project implementation areas in Maharashtra and Gujarat.
- To understand and assess the water footprint in select plots of cotton in relation to different varieties in different production sites in Maharashtra and Gujarat.
- To understand the environmental impact of certain cotton production systems on water resources in both the states.
- To understand the economic impact of certain cotton production systems (water footprint of defined production unit and water foot print of defined profit unit).
- To assess potential risks of water footprint on achieving sustainable cotton production.
- To recommend measures on reducing water footprint in cotton production system in both the states.

Sampling procedure

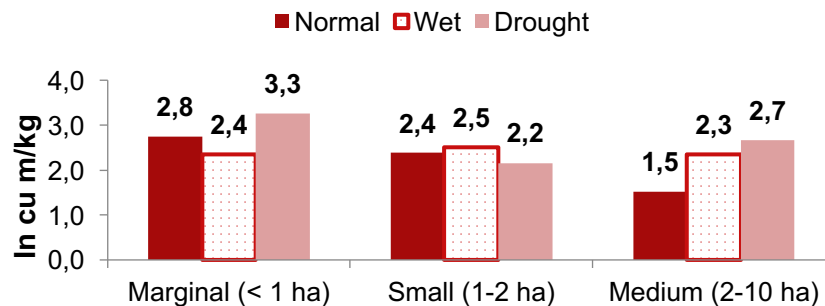
- Overall, 213 farmers were surveyed.
- Representation of selected farmers from the small, marginal and medium farmers.
- For estimating crop ET, effective rainfall (P_E) and irrigation requirement, FAO CROPWAT model was used.



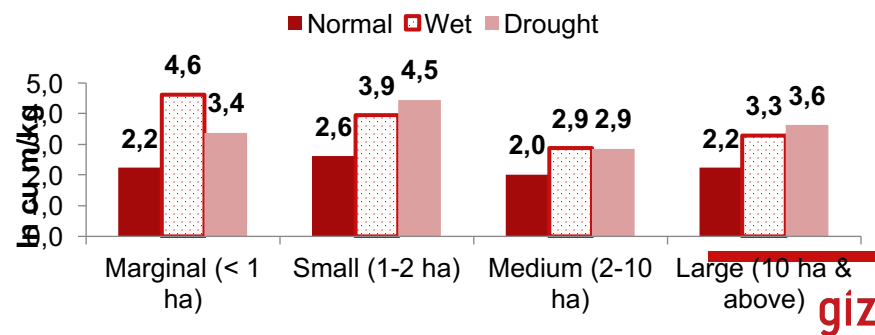
Green water footprint in cotton production

- In both the states, the green WF is lowest during the normal year
- Marginal and small farmers, who mostly rely on rains, have high green WF.
- In most cases, the green WF increases with the increase in crop duration as the ET increases disproportionately.
- During normal year, the lowest green WF is for the crop grown for 181-210 days in Gujarat whereas for Maharashtra it is for one with duration of 150-180 days.

Average green water footprint, Gujarat



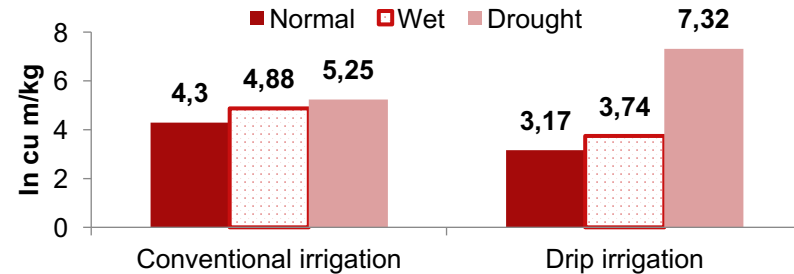
Average green water footprint, Maharashtra



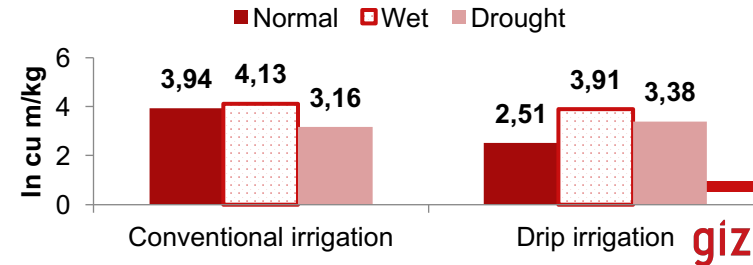
Water footprint of irrigated cotton

- WF of irrigated cotton was lower for cotton under drip than under conventional method. Drought year is exception.
- In Gujarat WF is highest during drought year as yields are low
- In Maharashtra, it is during wet year where farmers apply water in excess of crop water requirement.
- In Maharashtra, irrespective of the rainfall conditions and irrigation practice, WF is lowest for the crop harvested within 150 days of sowing (up to 2.01 cu m/kg).

Average water footprint of the irrigated cotton, Gujarat



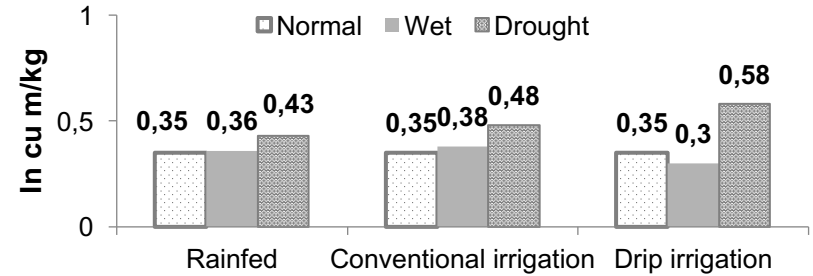
Average water footprint of the irrigated cotton, Maharashtra



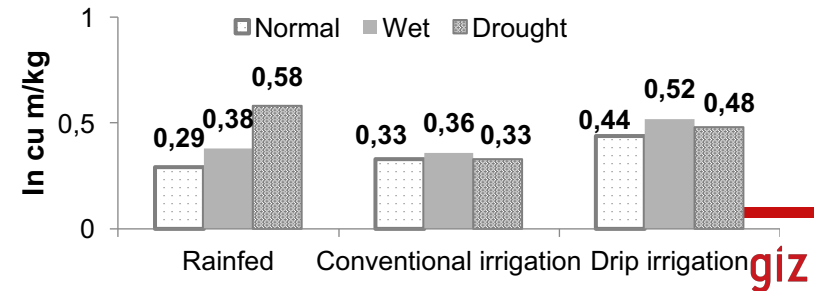
Grey water footprint in cotton production

- Pollutant that has a maximum contribution to the grey water component is the fertiliser.
- In both the locations, highest grey WF for the rainfed cotton is during a drought year.
- Irrespective of the rainfall conditions, the grey WF for the rainfed cotton and that for irrigated cotton was highest **for varieties with duration of less than 180 days.**
(Up to 0.88 cu m/kg in Gujarat and in 0.7 cum/kg in Maharashtra)

Average grey water footprint of the cotton, Gujarat



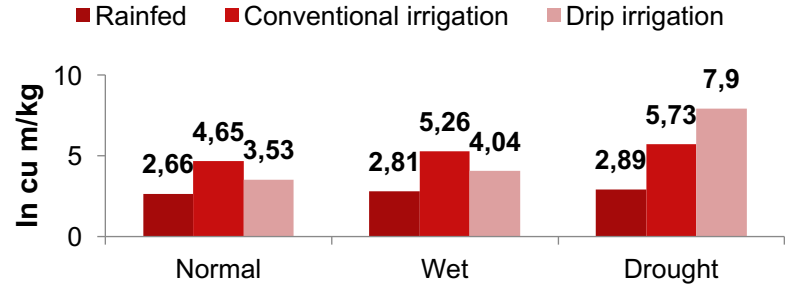
Average grey water footprint of the cotton, Maharashtra



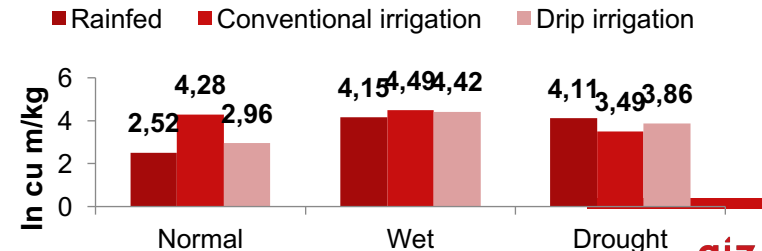
Total WF in cotton production

- Conventionally irrigated plots have high overall WF during wet and normal rainfall years
- In Gujarat, farmers over-irrigate fields under the conventional method
- For rainfed cotton, marginal farmers in Gujarat (at 3.4 cu m/kg) and small farmers in Maharashtra (4.2 at cu m/kg) have high WF.

Total WF for cotton production, Gujarat



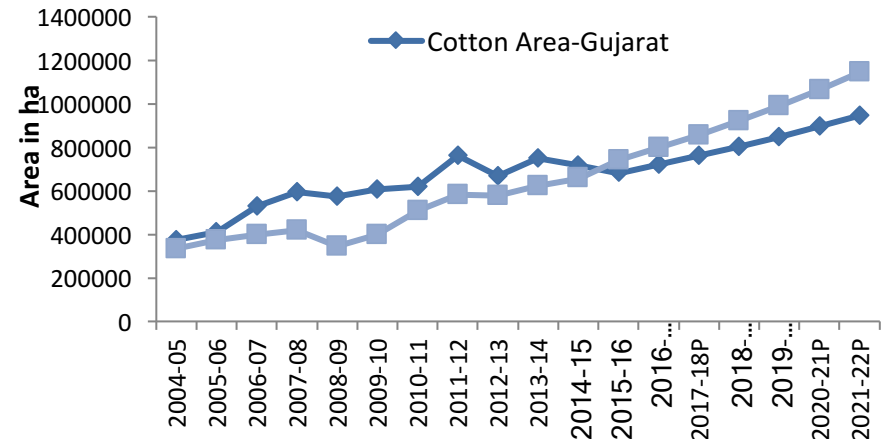
Total WF for cotton production, Maharashtra



Risks of present water footprint of cotton production

- By 2021-22, the annual blue water use for cotton production in the selected districts of Gujarat will be 1235 MCM, which is 42% of the annual groundwater availability.
- For Maharashtra, it will be 455 MCM, which is 33% of the total annual groundwater withdrawal.
- By 2021-22, selected districts of Gujarat will generate about 390 MCM and Maharashtra 108 MCM of grey water.
- Most of this will be in the form of diffuse pollution & poses a threat to the quality of the receiving water bodies.

Historical change in Cotton Area in Gujarat and Maharashtra



Our action plan

- Optimising the **fertiliser dosage** in cotton (training, soil testing)
- **Digital solutions** to the farmers on timely agro-advisories including soil moisture, weather and market information
- Promoting **intercropping** and **crop rotation** to improve economic productivity of rainfed cotton
- Training farmers on **optimum irrigation** for the short duration cotton (1-2 supplementary irrigation)
- Promotion **drip irrigation**
- Introducing **irrigation-scheduling** to enhance water use efficiency
- Promoting **mulching** and **minimum tillage** for retaining soil moisture and reduce non-beneficial evaporation
- Support preparation of district level **Comprehensive Water Resource Management Plan** (using GIS and remote sensing)

Thank you!



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