Reducing the Water Footprint of the Global Cotton-Textile Industry: Efficient Use of Advanced Dyeing Chemicals, Technologies and Wastewater Treatment in Pakistan

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INTRODUCTION

German demand of cotton-textile products is responsible for substantial water consumption and wastewater effluents in Pakistan. The water footprint has widely been accepted as an indicator to assess the water efficiency of the cotton-textile production process. Methodologically, green (rain), blue (surface and groundwater), and grey (wastewater-based) footprints are calculated.

Within this collaborative project InoCottonGROW Pakistan and German research and industry partners intend to contribute to sustainable water resources management in Pakistan by implementing various case studies and demonstration projects. Here different approaches are shown to reduce water consumption and effluents along the cotton-textile value chain by the use of efficient process chemicals, advanced technologies and suitable wastewater treatment methods in textile dyeing processes.

RESULTS OF INDUSTRIAL REACTIVE JET DYEING PROCESSES IN COLOUR BLACK

Results: All four trials show first poor results in fastness to wet rubbing testings. Solution: A further rinsing at 40 °C or 60 °C (under lab conditions) causes acceptable results regarding industrial requirements. The small variation of the ΔE value (CMC/D65) which is < 1 indicates a negligible change of the starting colour.

NEXT STEPS IN INOCTEXTING

Dyeing recipes and processes: need further adjustments to make sure colour and testings will also fulfill industrial requirements.

Onsite trials: The optimized processes will be demonstrated on full-scale dyeing machines at STYLETEXILE to proof their water- and energy saving potential.

Wastewater treatment: Two wastewater treatment pilot plants will be operated at textile mills in Pakistan to demonstrate efficient and cost-effective technologies to reduce wastewater emissions.

Water footprint: The gathered data will be added to the InoCottonGROW database and thereby help to calculate the water footprint of the Pakistani textile industry.

TEST PARAMETERS FOR THE COMPARABILITY OF DYEING RESULTS AS AN INDUSTRIAL QUALITY CONTROL TOOL

<table>
<thead>
<tr>
<th>Colourimetry</th>
<th>Colour Fastness</th>
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<tr>
<td>hue</td>
<td>lightness</td>
<td>saturation</td>
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<tr>
<td>CMU EN ISO 105-7-A1M (grade)</td>
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<td>P1</td>
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LABORATORY-SCALE WASTEWATER TREATMENT

Measured parameters:
- Conductivity, pH
- COD, BOD₅
- NH₄-N, NO₃-N, TN
- SAR, Kₐ
- TOC and DOC

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