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Further reading


Pathways to impact briefs
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“The insights gleaned are of great value to breeders in selecting appropriate crop traits to complement drought tolerance,” says John Dixon, who led the study.

The priority farming systems were identified in another GCP-commissioned study led by Hyman (see Further reading). These systems have large numbers of stunted children, frequent droughts and large areas of food crops.

Reaching those in greatest need, and maximising impact
The production study focused on cassava, chickpeas, cowpeas, rice, sorghum and wheat, which are important crops in most of the 15 high-priority farming systems across Asia and sub-Saharan Africa. In identifying abiotic, biotic, management and socio-economic constraints – along with suggested solutions – the study relied on farmers, local researchers, extension agents, agribusiness and non-governmental organisation staff with knowledge of, and experience with, each farming system, and other experienced development professionals.

What’s crippling farm yields?
The severity of the constraints was measured by yield gaps (ie, the difference between smallholders’ actual and potential yields). On average, the yield gaps for rice tended to be much smaller than those for wheat and cassava, while sorghum, chickpeas and cowpeas had the widest yield gaps.

Dixon observes, “For many crops, the vast majority of farmers are only getting half the potential yields. In drier drought-prone farming systems, the gaps are even wider, in the collective wisdom of more than 600 people that we spoke to from different backgrounds and areas of expertise.”

Across most of the farming systems, abiotic and management constraints accounted for most of the yield loss for wheat; for rice and cassava, socio-economic and management constraints dominated; for sorghum, abiotic constraints were most severe; and for chickpeas and cowpeas, biotic constraints dictated yield loss. Though there were differences between crops and farming systems, on the whole, each of the four constraint types contributed roughly equally to total yield losses. The table summarises the most severe constraints for each crop and region.

What can we do now?
For crops such as sorghum, cowpeas, cassava and chickpeas, the study proposed a broad range of system-specific solutions to major constraints. Many of the solutions proposed for wheat and rice revolved around creating germplasm tolerant or resistant to various pests, diseases and water-related stresses.

<table>
<thead>
<tr>
<th>Key constraints in crop production</th>
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<tbody>
<tr>
<td><strong>Abiotic</strong></td>
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<tr>
<td><strong>East Asia &amp; Pacific</strong></td>
</tr>
<tr>
<td>Cassava</td>
</tr>
<tr>
<td>Rice</td>
</tr>
<tr>
<td>Wheat</td>
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<tr>
<td><strong>South Asia</strong></td>
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<tr>
<td>Chickpeas</td>
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<tr>
<td>Rice</td>
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<td>Sorghum</td>
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<tr>
<td>Wheat</td>
</tr>
<tr>
<td><strong>Sub-Saharan Africa</strong></td>
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<tr>
<td>Cassava</td>
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<tr>
<td>Chickpeas</td>
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<tr>
<td>Cowpeas</td>
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<tr>
<td>Rice</td>
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<tr>
<td>Sorghum</td>
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<td>Wheat</td>
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</tbody>
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* Bold represents dominant problems of the region: N = Nitrogen.
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Overall, a multifaceted intervention approach is required, combining – among others – improved germplasm with input availability, credit accessibility, and training and extension programmes.

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A call for collective action in agricultural research

A multi-faceted approach to solve a multi-faceted problem

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To address the multiple constraints limiting smallholder yields in Asia and Africa, new germplasm must be integrated with other agricultural research and development initiatives.