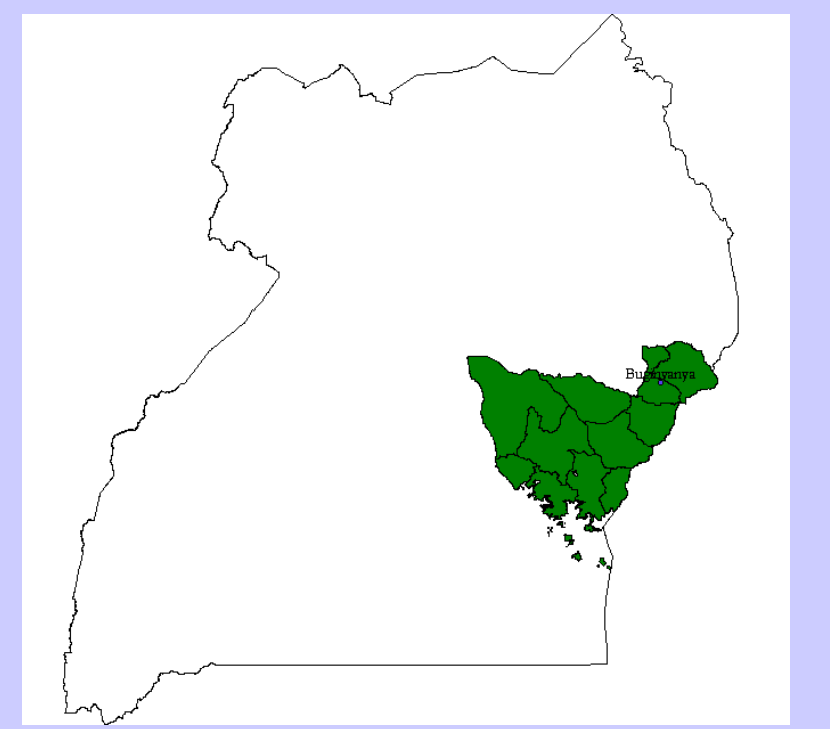




Wheat productivity: Identifying the challenges

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What are the issues?

- Very little additional land is available for expansion of crop production due to the otherwise high cropping intensity in producing areas.
- Increased total production of the crop cannot be realized through area expansion.
- Currently, average yields of 0.5t ha⁻¹ and 1.2t ha⁻¹ are realized by small-scale farmers
- Wheat, also may suffer from a number of insect, disease, weed, nutritional, and environmental stresses.
- NARO-BugiZARDI developing technologies for improved productivity of wheat through management of major diseases especially rusts.

Preliminary activities

1. Participation in international screening nurseries
2. Evaluation of promising wheat varieties for zonal adoption
3. Mutation breeding of local varieties for disease management
4. National wheat adoptability studies

What are the current disease constraints?

- 1) **Stem rust** caused by *Puccinia graminis* attacks the leaves, stems, and heads of wheat. It is the only kind of rust that attacks the stems. Pustules of stem rust tend to be longer, more ragged, and darker brown. As pustules age, they turn dark (see Fig 1 & 2) requires higher temperatures than the other rusts, so it is more commonly seen at the end of the



Fig 1. Stem rust on stalk



Fig 2. Stem rust on leaves

- 2). **Leaf rust** caused by *Puccinia recondita*. Damage to wheat depends on its growth stage at time of infection relative to the degree of rust development. Epidemics that occur before or during flowering are most serious, especially when the flag leaf becomes severely infected. Leaf rust kernels per head, by reducing the size of kernels, by lowering test weight and hence lowering the protein content of the grain.



Fig 4. Showing high severity of leaf rust on leaves of wheat growing in Kabale, Western Uganda

- 3) **Yellow (stripe) rust** caused by *Puccinia striiformis*. Symptoms of stripe rust include long stripes of small yellow or orange blister-like lesions called “pustules”. The disease primarily occurs on the leaves; however, glumes and base of the awns also can be affected. The blister-like lesions produce massive amounts of spores that are easily dislodged. These spores may appear as orange dust on the clothing of individuals that have recently walked through heavily disease fields. It can develop at lower temperatures than the other rusts and, therefore, can increase earlier in the season and act upon the host for a longer period of time.



Fig 4. Showing yellow (stripe) rust on leaves of wheat growing in Western Uganda

Management options

- 1) **Chemical.** Fungicides are effective against stem, stripe and leaf rusts. Use the recommendations given by manufacturers after doing proper field inspection to ascertain incidence otherwise the costs can be limiting.
- 2) **Cultural:** Eradication of alternate host is recommended as a method of controlling teliospore inoculum. This can be achieved through crop rotation with potato or non cereal crops and field sanitation by destroying plant debris.
- 3) **Resistance:** Researchers are developing resistant cultivars, but occurrence of numerous pathogenic races of the fungus reduces their effective use. Genetic deployment is used to thwart the rapid buildup of pathogenic races. This tactic will rely on planting scattered genotypes to avoid a continuum of the same source of resistance, thus preventing the proliferation of a single rust race. Pathologists also recommend planting early maturing cultivars that ripen before rust can become severe.

The way forward

- Use mutation breeding to produce rust resistant locally adapted varieties
- Develop disease management package for wheat farmers
- Develop breeders seed of adaptable varieties from international trials
- Adopt wheat varieties for the low altitude to increase productivity and use of machinery
- Build capacity in wheat management techniques among farmers and technical district staff
- Increase participation in international wheat breeding