Fungal endophytes of important African forage grass *Brachiaria* spp. in Kenya

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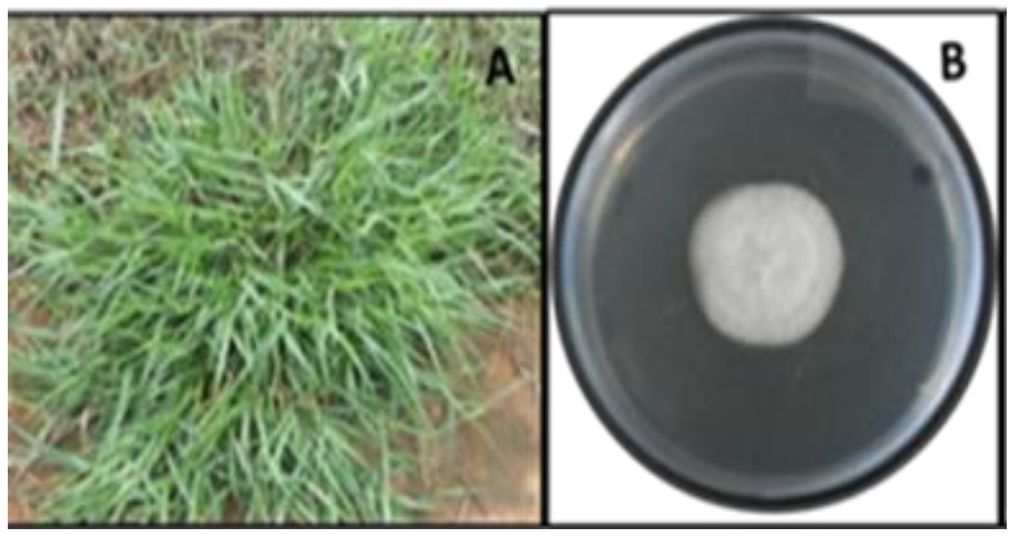

Project summary

Endophytes are microbes that live inside host plants without causing disease. Many fungal endophytes form beneficial associations with hosts and confer several fitness advantages like resistance to pests and diseases, tolerance to drought stress and improvement in plant growth and development. Fungal endophyte research at BecA-ILRI Hub aims to develop methods for isolation, identification and characterization of endophytes of Brachiaria grasses; examine cultivable fungal community and use selected member(s) for enhanced adaptation of Brachiaria grasses to drought and low fertility soils

Outputs

- Methods for isolation, identification and characterization of endophytes were developed.
- Over 700 fungi were isolated and molecular ID was generated for 515 fungi.
- Analysis of 18S rRNA gene (partial), ITS1, 5.8S rRNA gene, ITS2, and 28S rRNA gene (partial) sequences of 94 shoot and 260 root isolates identified 45 and 44 taxa, respectively.
- Fungi from aerial parts comprised of 45 taxa and were from two phyla, six classes, 13 orders, 18 families and 31 genera (Fig 1.) with species diversity (H) of 5.17.
- Root fungi consisted of 44 taxa from two phyla, five classes, 10 orders, 12 families and 20 genera with species diversity (H) of 4.30 (data not shown)
- Among fungi detected were members of genus *Acremonium* and/or *Sarocladium* which are known to transmit vertically through seeds and confer resistance to leaf spot disease in Brachiaria grass.

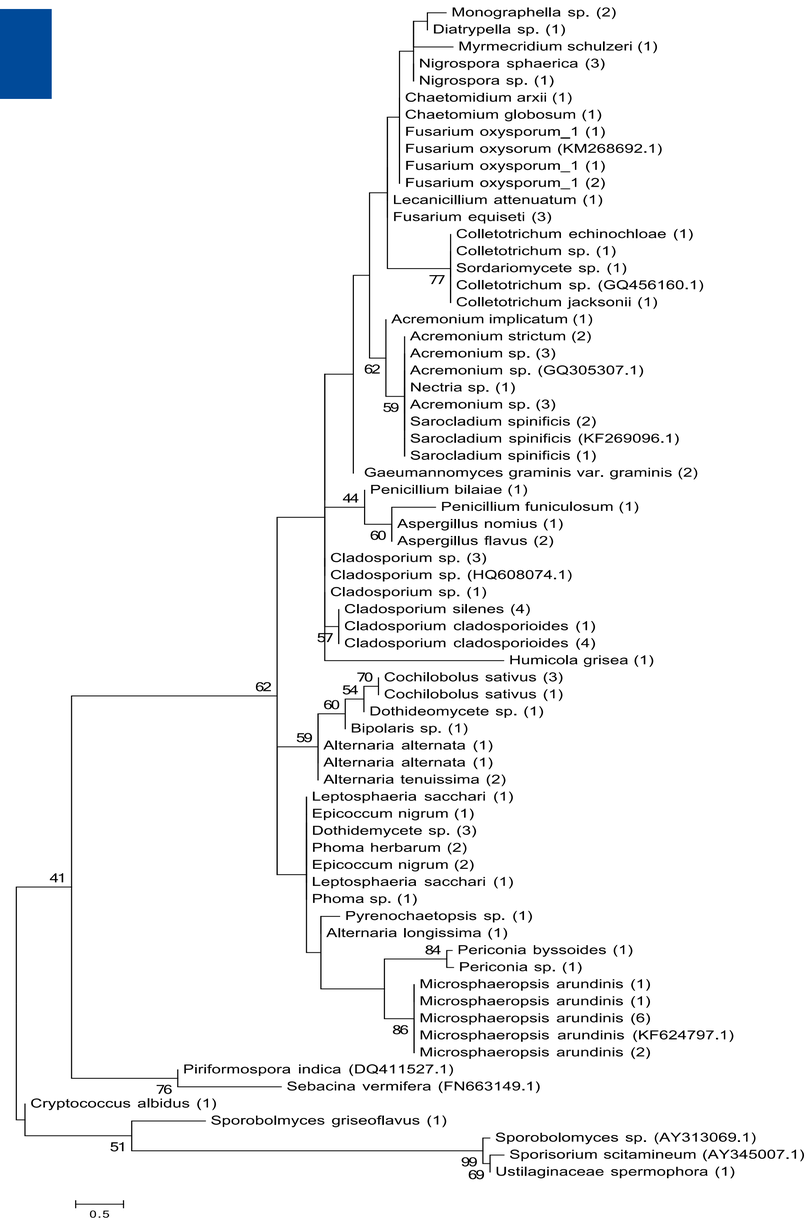

FIG 1. Phylogenetic relationships among fungal isolates from the aerial part of Brachiaria grass. The evolutionary analysis was inferred using the maximum likelihood method, based on the Kimura 2-parameter substitution model at 1000 bootstraps.

Outcomes

- Microbial methods developed to study endophytes and other plant associated microbes in Brachiaria grass have been regularly utilized by the plant pathology and microbiology laboratory users at BecA-ILRI Hub and researchers from collaborating institutions (CIAT-Colombia and AgResearch) and other international institutions (Tel Aviv University, Israel). The methods have also been used successfully for isolation, identification and characterization of endophytes of Napier and other grasses from drylands.
- Diverse groups of fungi with varied relationships with host plants ranging from beneficial to pathogenic were identified. The potential agricultural application *Acremonium* spp. and Fusarium species are currently being evaluated.
- Use of microbe based biologicals is emerging approach for agricultural and environmental sustainability. There has been considerable interest of research communities in region on microbial studies for agricultural uses.

Partnerships

1. Kenya Agricultural & Livestock Research Organization, Kenya
2. Rwanda Agriculture Board, Rwanda
3. International Center for Tropical Agriculture, Colombia
4. Grasslanz , New Zealand
5. AgResearch, New Zealand

Potential to scale-up

- Use of microbial agents is regarded as environmentally friendly and sustainable approach of increasing agricultural productivity. These microbes help in maximizing water use efficiency, minimizing agrochemical uses and also provide high degree of persistence to plants against biotic and abiotic stresses. Therefore, there is huge potential of microbial technologies to fight negative effects of climate change on agriculture. Multinational agricultural companies are investing on the discovery and commercialization of naturally occurring microbial products.

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February 2016