Automatic Plant Disease Detection, Classification and Management

BACKGROUND

This project carried out research on main crop pathological diseases common in Afghanistan, Cambodia, Laos, Philippines, and Bangladesh. These diseases reduce yields and therefore income levels for hundreds of thousands of farmers in the affected countries.

As part of this project software and mobile apps have been developed for plant disease detection and classification through Artificial Neural Network based image processing. In addition, mobile apps have been developed for early-stage disease detection and solution for different diseases of rice, jute, wheat, maize, and beans.

The project also included agricultural field visits in Bangladesh to better understand and include the experiences of farmers regarding agricultural diseases. The research project incorporated a website based survey through (https://nrenagrodisease. bdren.net.bd) which provided access to all partners. IoT and wireless sensors also supplied relevant information via mobile apps to farmers and researchers.

OBJECTIVES

- **Baseline Survey:** Conduct survey and discussions with farmers and research specialists regarding plant disease detection and classification.
- **Web-based Survey System:** Develop a web-based survey system for obtaining qualitative information on agricultural disease management

- **Advanced Image Processing:** Apply advanced image processing for plant disease detection and classification. This imagery was analysed and shared via a cloud-based system
- **IoT and app-based Monitoring:** This was used to monitor crops in the field.
- **Visibility Plan:** Introduce the NREN infrastructure and facilities for the farmers through website-based system in the countries connected with Asi@ Connect.
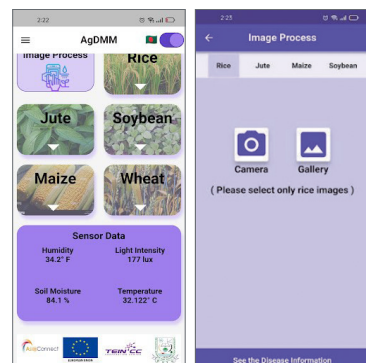

Figure 1_ Workshop participants

Figure 2_ Screen shot of mobile app sensor read-out

CHALLENGES

- Covid-19 timing – we hastily re-arranged our training schedule as the pandemic progressed. This was very inconvenient, but we would like to pay tribute to the substantial number of people in many countries who worked hard to make this project happen
- Arranging competent resource personnel for training seminars was a challenge, but we succeeded by using our extensive personal networks and also providing some token payments to presenters.
- Participation by some staff in beneficiary countries was low, which was unfortunate. This was surprising to us as they seemed very keen to be involved in this important topic. We do recognize that (again) COVID-19 placed a lot of stress across borders and within institutions.
- The low response rates to our survey questionnaire were disappointing.

ASI@CONNECT SUPPORT

- Asi@Connect supported the full financing of the project plus provided a wide range of very helpful logistical support
- Asi@Connect helped to conduct the baseline survey via https://nrenagrodisease.bdren.net.bd.
- Asi@Connect helped to arrange the two-day workshop with farmers on ICT based technique for plant disease monitoring and management in agricultural field in Bangladesh

BENEFITS TO TEIN COMMUNITY

- **Baseline/web Survey:** this survey improved our understanding of the diseases affecting main crops and how farmers can address their knowledge levels
- **Workshop and Seminar:** local farmers and even other experts were exposed to new, digital approaches to disease detection and monitoring. This was very popular and successful. There is a great desire by end-users for this type of knowledge. Farmers know that small improvements in quality and yield can result in revenue gains for them. A few extra dollars per month can make a meaningful difference to their lives, and those of their family and community
- **Mobile Apps Development:** Smartphone-based technology was also very popular and this project illustrated once again that a cheap Android-based device is an excellent format for supporting agricultural development (along with all the other benefits of a smartphone).
- **Sustainable Development Goal:** In summary, this project showed that sustainable development of agriculture sector with associated poverty reduction through the utilization of ICT is a valuable and cost-effective way of improving beneficial outcomes.