Wheat Rust Early Warning and Advisory System in Ethiopia:
Impact Assessment in Two Major Wheat-Growing Regional States

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7. Conclusion and policy implications

Using primary data collected from more than 1,000 households located in 17 districts and 2 regions of Ethiopia, this study examined the impacts of the wheat rust early warning advisory system. Both yellow rust and stem rust are major yield-affecting biotic factors in Ethiopia. Control of wheat rust can be instrumental in ensuring the sustainable production and food security of the country.

Since 2015, the University of Cambridge, the U.K. Met Office, the Ethiopian Institute of Agriculture Research, the Ethiopian Agricultural Transformation Agency (ATA), and the International Maize and Wheat Improvement Center (CIMMYT) have developed and deployed an early warning and advisory system (EWAS) in Ethiopia (Allen-Sader et al., 2019; CIMMYT, 2019). The system provides an automated 7-day advance forecast about a possible outbreak of rust. The EWAS was piloted and has now been operational for over four years in Ethiopia. It has been providing early warnings and advisories about rust to hundreds of thousands of wheat farmers through the Ministry of Agriculture, ATA 8028 farmer hotline, EIAR research networks, Regional Bureaus of Agriculture, and the extension services.

Although it is challenging to separate its impacts completely from the impacts arising from broader ongoing efforts around wheat rust control in Ethiopia, this study provides strong indications that there has been a positive benefit from the wheat rust EWAS in Ethiopia. Surveyed farmers in both Amhara and Oromia considered the EWAS to be beneficial and expressed a strong interest in receiving early warning information on wheat rusts. There was a strong demand for information on wheat yellow rust in Amhara and information on both stem and yellow rust in Oromia. This demand reflects the prevalence of rusts previously reported from disease surveys (Meyer et al., 2021). In both regions, but especially in Oromia, farmers said that they had a better awareness of wheat rusts, and that their ability to control wheat rusts had increased.

The study revealed that access to the early warning messages by farmers had increased, with 65% of sampled farmers in Amhara reporting that they had received messages in 2020 (up from 31% in 2015) and 80% in Oromia (up from 52% in 2015). The econometric findings of this study demonstrate that the education of the household head and social networks are the main factors that affect farmers’ access to the early warning messages. Half (50%) of the households in both Amhara and Oromia regions reported that they received the messages through the agricultural extension agents.

Farmers that received early warning messages were more likely to use fungicides and spend more on fungicides than farmers who did not receive messages. In Oromia, sampled farmers that received early warning messages about possible outbreaks of wheat rust spent considerably more on fungicides than their counterparts. This probably indicates that this group of farmers are applying multiple fungicide sprays, or possibly purchasing more expensive products with improved efficacy. In Oromia, there was evidence that farmers who did not receive early warning messages directly were also increasingly using fungicides. This may reflect the overall increased awareness of wheat rusts reported by farmers.

The surveyed farmers and extension agents felt very strongly that significant yield losses were averted as a result of the EWAS and the control actions taken by farmers as a result of the early warning messages. In both Amhara and Oromia, the estimated economic and productivity gains of averting such perceived losses would be considerable — 505 kg/ha (US$ 290/ha) in Amhara and 860 kg/ha (US$ 364/ha) in Oromia. Conversely, a comparison of actual reported yields in 2019 between farmers that had accessed the EWAS messages and those that had not gave contradictory results with an indication of lower yields amongst farmers in Amhara who had accessed the messages. The factors behind this apparent anomaly are unknown and need further investigation.
Even though the early warning system is a public good and access is increasing, at least one-third of the farmers surveyed did not have access to this service. Access was more limited in Amhara, although the demand for early warning information on yellow rust was high. More effort is needed to ensure increased access to the EWAS, especially in Amhara. Our estimation shows that education and social networks are the main factors that shape access to the early warning system. Therefore, investment in general education for the younger generation and training for older farmers to enhance their ability to ensure their stake in the public good system is suggested.

The institutional-level findings revealed clear changes in the practice and capacity of rust disease surveillance and monitoring over the past few years, mostly at the federal level and in the Oromia region. The rust early warning advisories have contributed to improving the planning and operation of federal initiatives concerning wheat rust management. The rust early warning advisories have enabled preparedness and early planning for rust at the ministry level. They have also helped advise fungicide importers in advance of rust outbreaks, deploy experts to rust hotspot areas, plan trainings at different levels of the extension system, and prompt scouting of disease incidence and early advice to stakeholders. The regular rust planning meetings have strengthened institutional collaboration and internal team integration among federal institutions and their partners and attracted the attention of high-level decision-makers. Moreover, the awareness created through the rust planning meetings has helped to strengthen wheat rust trap nurseries in the country for rust monitoring. Although some of the recent changes are dictated by the advance of and increasing access to communications channels, there is a strong indication that the consistent availability of the rust early warning advisories is the main driver of the changes.

There are regional disparities in awareness, access, and use of the rust early warning and advisory system, and there is a need to close the gaps through concerted efforts by concerned institutions. There is also a weak communication channel between the federal ministry and the regional bureaus of agriculture in delivering the rust advisories to extension agents and farmers; this communication channel must be strengthened. Integrating the rust advisories with the climate agro-advisories would help solve a communication gap and enhance the recent efforts to provide integrated services to smallholder farmers. This study also indicated a strong need to scale up the rust early warning advisory system through improved rigor and accuracy and through building national capacity at federal and regional levels.

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