Development of a control strategy for Faba bean gall: A devastating faba bean disease in Ethiopia

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Faba bean cultivation is an essential part of the Ethiopian highlands farming systems with over 450,000 ha sowed annually, making it the most important winter pulse in the country and Ethiopia the second largest (after China) faba bean producer in the world. Faba bean (and other pulses) form a vital source of protein for the rapidly growing Ethiopian population, particularly for low-income households, and also plays an important role for maintaining soil fertility. Rainfall in the Ethiopian highlands is variable, but seasons with high and frequent rainfall are common. The highly disease conducive environment in wet years result in frequent and severe epidemics of a range of faba bean diseases like chocolate spot, rust, Ascochyta blight and root rots.

A decade ago an unknown disease was noted in a number of faba bean fields in the northern highlands. The disease caused numerous galls on leaves and stems and could cause complete crop failure. Based on these symptoms the disease is called 'Faba bean gall' (FBG) or 'Qormid' in the local Amharic language. The disease is clearly favoured by high rainfall and can be transmitted by contaminated soil. It has spread rapidly through Ethiopia and is now already reported in all faba bean growing regions. The causal agent not yet established, but the presence of zoospores and sporangia in leaves point to a Chytrid species. The only reports of a similar disease on faba beans are from spring sown crops in the high altitudes of western China and is attributed to *Olpidium viciae*. However, while *Olpidium* species are well known vectors of virus diseases, they are not known to cause severe damage to foliage of host plants.

A collaborative project, involving Ethiopian and Australian research institutes and supported by the Australian Centre for International Agricultural Research, commenced in 2019 to develop control strategies for this disease. Its first objective is to properly identify the causal agent. Fungal DNA will be isolated in Ethiopia and brought under permit into Australia for in-depth analysis at the University of Western Australia. Chemical control methods will be evaluated as a stopgap option, but long lasting control is expected to come from incorporating resistance into locally adapted germplasm. In order to identify sources of resistance, testing methods will be developed to evaluate faba bean germplasm from diverse origins in field and greenhouse tests.

The project will be of great value to Ethiopian farming families, but also has substantial benefits for the Australian faba bean industry: Knowing the cause of FBG and its epidemiology will allow for the development of a sound containment strategy in case this disease ever enters the country. It also provides opportunities to test Australian faba bean breeding material in Ethiopia for disease resistance, not only for FBG but also for a range of diseases that are of importance in Australian fields.