

Improving faba bean for sustainable agriculture in dry areas

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2. Presenters Fouad Maalouf, PhD, Senior Faba bean breeder, ICARDA

3. Short Description of what will be discussed during the presentation (about 250 - 500 words)

Faba bean (*Vicia faba*) is one of the oldest crops, originated in the Fertile Crescent and is now distributed around the world and produced under different agro-climatic conditions in Mediterranean and semi-arid conditions as a rainfed and in Nile Valley countries as irrigated crop. It is a good source of food, incomes to smallholder farmers and plays an important role as rotation and mixed crop in improving soil fertility that helps sustainable production of cereal crops and in conserving the ecosystem. Since the crop is partial allogamous benefits from the presence of insect pollinators. However, faba bean is threaten by diverse abiotic and biotic stresses. Among abiotic stresses heat, drought, salinity and soil acidity are the major constraints of the crop while *Orobanche crenata*, stem borer, aphids and fungal and virus diseases are key factors for high yield gaps. The International Centre for Agricultural Research in Dry Areas (ICARDA) holds the major and unique faba bean germplasm collection (10036 accessions), which has been used in gene mining that led to release of cultivars for high yield and tolerant to abiotic (heat and drought) and biotic stresses (fungal diseases and parasitic weeds) in many countries. Faba bean improvement program at ICARDA has generated many elite germplasm with high yield, low tannin content, market traits and resistant to diseases, parasitic weed and tolerant to heat and drought and shared with National agricultural systems (NARS) and many cultivars are developed and released. During the last 10 years 21 faba bean varieties were released by NARS from ICARDA International Public Goods (IPGs) and bringing impacts on the productivity and area increases in China, Ethiopia, Sudan and Egypt. In Ethiopia, various varieties (Gora, Gelbechu, Moti and Walki) are being scaled out in the wheat-based cropping system in Ethiopia. In Egypt, parasitic weed resistant cultivars (Giza843 and Misr3) helped in the rehabilitation of faba bean in Egypt leading to 25% area increase. In China, cultivar Yandoo147 covered 140,000 ha in Yunnan province. Besides the achievement made so far, the breeding efforts are relatively slow due to the nature and mechanism of resistance of key diseases, parasitic weeds and abiotic stresses. To accelerate breeding cycles, there is a need to use the emerging biotechnological tools, such as marker-assisted selection, which have not been widely

adopted despite significant achievements on quantitative trait loci (QTL) studies and the development of consensus maps in faba bean. The progress made in tissue culture and genetic transformation of faba bean can help to the introgression of sources for multiple stress resistance/tolerance into high yielding and adapted cultivars.

4. What will the audience take away from your presentation? (Try to list 3-5 specific items)

- The audience will be able to know the past research, the current situation of faba bean improvement and the trend in the future, especially on the advance in research and molecular tools and transgenic approach in faba bean.
- The researchers can have access of the Germplasm and they can also know the metrologies used for screening for biotic abiotic stresses and physiological and biological measures associated with heat and drought. This can be useful for other crops. It might be also materials for teaching.
- The presentation will be focusing on research for development and will show major outcomes and impact of the breeding program as the area covered of the released varieties.

6. Is this abstract connected to an organized session? If yes, please provide full session title.

7. Biography of presenting author (about 100 words)

Fouad Maalouf is a senior scientist working at ICARDA since 2007. He holds PhD and Post-doc on faba bean breeding at Cordoba University-Spain on the development synthetic varieties in faba bean under Drs. Jose Ignacio Cubero and Maria Jose Suso. He coordinated Lebanese component of EU project on “Durum wheat water use efficiency” at LARI and was teaching botany and Genetics at Saint Joseph (1997-2007) and Lebanese Universities (2003-2007). His current research focus is the faba bean Improvement. He has supervised 19 students, including 3 PhD, 10 Master and 6 undergraduate students on different aspects of faba bean breeding. He authored or co-authored more than 39 research publications, including 32 referenced journal articles. He contributed to the release of 12 faba bean varieties with NARS partners.

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