

## BM-11

The role of germplasm as a key factor in the changes of crop production systems and yield increase in South America

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Soybean (*Glycine max* Merr.) is the most important leguminous crop in the world and an important source of protein and oil for food and feed. The increase in soybean yields in the last 30 years has been achieved through genetic gain, management gain and the interaction between them. During the period from 1978 to 2016, average on-farm soybean yields have increased at a rate of 33, 44 and 23 kg hectare<sup>-1</sup> year<sup>-1</sup> in USA, Brazil and Argentina respectively. Previous studies suggested that at least 50% of the yield increases in soybean are the result of improved genetics. In the decades of the 70's and 80's the soybeans in South America were introduced with the "full-season" crop concept used mainly in the USA Mid-West area, under the assumption that maximum frost-free period would maximize biomass which in time would determine maximum yields and better tolerance to stress. However, in the mid 90's in Argentina, the presence of biotic and abiotic problems related to this model led the industry to release early maturity group varieties capable of exploring better environments during the critical period of soybean (R3 to R5) and avoiding biotic stress factors. Early maturity groups and indeterminate growth habit, combined with new available technologies (no-till system and GMO Events with Glyphosate resistant soybeans among others), provided not only higher yield potential but also yield stability. In a similar scenario but from 2006 and on, Southern Brazil suffered a big change in the use of genetic resources in soybeans, moving rapidly from determinate cultivars of longer Maturity Groups to Indeterminate Earlier cultivars, leading to a big increase in the yields and a wider window of opportunity for planting. In several areas indeterminate and early maturity genotypes were key to the double crop or "*safrinha*" system (soybean-corn double crop) which rapidly grew in area. At present, the use of early maturities with indeterminate growth habit cultivars is also growing in the Cerrados area and it is yet to be seen how spread out this practice will be in the future. The aim of this work is to demonstrate how changes and diversity in genetic offer throughout the last decades influenced deep changes in the soybean production systems in different areas of South America.