Suggestions for future priorities of German-Brazilian Cooperation in Science for Sustainability – implementation of adapted and of advanced technologies for precision agriculture practices

José P. Molin, University of São Paulo, College of Agriculture "Luiz de Queiroz", Brazil

Brazilian agriculture economy has evolved significantly on recent years, resulting on a global leadership on several products like orange juice, coffee, sugar and ethanol, as well as a competitive production of soybean products, meat, poultry, corn, paper and cellulose and tropical fruits. Modernization is associated with the development of sustainable systems based on conservation tillage (no-till), covering more than 50% of the cultivated area of annual crops. More recently precision agriculture has been challenging farmers, researchers and industry, after starting as an exotic technology in the mid 1990's. The main aspect of precision agriculture is related to the fact that the soil of any agricultural field is not uniform on its physical and chemical characteristics, resulting on significant yield variability. This variability may be seen as chances for improving yields and reducing inputs and consequently environmental impacts (Schueller, 1992).

Recent adoption trends show that local users did not follow the model as it has been practiced abroad, but adjusted it to the local requirements and conditions. It resulted in a sustainable technological approach useful for farmers of different economical situations and farm sizes. Users are focused on savings on inputs, especially on fertilizers and lime, normally necessary in abundance on acid tropical soils. The most impacting tool available for managing it is the Global Navigation Satellite Systems (GNSS) and Geographic Information Systems (GIS) that make it possible and easy to investigate and interfere site specifically, resulting in savings on inputs and representing better soil equilibrium with higher yields and less environmental impact of the agricultural activity. There are several good examples of adoption and some reports of large areas of soybean and sugar cane being cultivated with savings of 10 to 30 % on lime and fertilizers just because it is possible to apply the inputs only where they are required, based on geo-referenced soil sampling and some additional treatments (Molin et al., 2004; Menegatti et al., 2006).

Besides that, there is another important front related to the auto steering systems for tractors and machines – an automatic steering or auto pilot which provides the farmer with an incredible accuracy for field traffic of agricultural equipment allowing saving fuel, time, physical stress and mitigating soil compaction. It has been the most impacting technology on recent years in the agricultural mechanization and its adoption has been greater than expected because of its immediate benefits to users. The land distribution for agriculture has its peculiarities and in the south the farms are smaller than in the Cerrado area, forcing a comparison with the average German properties. But there is also another segment of even smaller properties with very low income and almost no mechanization at all. In those cases the procedures and techniques have to be adapted to different levels of investment capacity and consequently technologies intensity solutions. Independently of the size of the farm the concepts are proved to be effective and the promotion of its adoption has to be viewed as an important target for the near future, giving opportunities for a strong cooperation between the two countries.

References

Menegatti, L.A.A. et al. (2006): Benefícios econômicos e agronômicos da adoção de agricultura de precisão em usinas de açúcar. Piracicaba: Un. of São Paulo, CD ROM.

Molin, J.P. et al. (2004): Variable rate fertilizer on coffee. Proceedings of the 6th International Conference on Precision Agriculture. Minneapolis: Un. of Minnesota, ASA/CSSA/SSSA., CD ROM.

Schueller J.K. (1992): A review and integrating analysis of Spatially-Variable Crop Control of crop production. Fertilizer Research, The Hague, 33:1-34.

Recommendations for enhanced sustainability oriented research and innovation cooperation between the two countries:
Exchange program on the technologies and practices of precision agriculture and related aspects.

Contact:
José P. Molin
E-mail: jpmolin@esalq.usp.br
www.agriculturadeprecisao.org.br