

15th International Rapeseed Congress, Berlin 2019

Concluding remarks by Wolfgang Friedt, GCIRC President

First of all, I would like to **thank you all** for your valuable inputs and many different ways. I hope that you as participants enjoyed the conference as much as we as the **organizers** did.

Ladies and Gentlemen, please let me recapitalize some highlights of the congress from my point of view.

GENETICS, GENOMICS AND BREEDING: Numerous approaches and technologies for investigating the **OSR and Brassica genomes** that did not even exist at the last congress have been established in recent years and are being applied. For example, the sequencing of long reads enabling to discover large and small scale **genome structural variation** in an unprecedented detail. This provides a great opportunity to understand **chromosomal rearrangements** or **cytoplasmatic evolution** in the interest of trait improvement. If someone had told you that one would instantly sequence several hundreds up to over thousand entire genomes of the worldwide rapeseed collection you probably would not have believed it. This enormous data resource enables the community to push the **Pan Genome** approach forward, which creates an extremely powerful data source to unlock the secrets of trait inheritance. For sure, this information will be a solid base for further understanding the complex regulation of relevant traits. Especially at a time when sequence information is doubling every couple of months, I am sure that there is still much to expect from this scientific area in the future.

But the mere description of DNA information is not enough: Only the link to **traits, i.e. agronomic or quality characteristics** will make all of the thousands of Terabyte sequence information useful. In this regard, it is good to see that better understanding of **plant genomes** can make a significant contribution to breeding progress. Especially, contributions on understanding **hybrid vigor**, the

development of **heterotic pools** and on the expansion of genetic pools and new ways of **predictive breeding** have been addressed.

A novelty that was already mentioned four years ago in Saskatoon but is now being implemented, targets the possibilities of genome editing. In the **Mutagenesis and Genome Editing** Session we have able seen far-ahead possibilities for precise modification in unprecedented accuracy, even in polyploid species like wheat or rapeseed (see keynote by G. GAO). Although, these technologies can currently not be practically applied here in Europe because of legal restriction, recent statements from various European countries to make a fresh start to adjust the **Genetic Engineering Act** give hope that local breeders may have access to these new opportunities in the future: Not only Breeders but also Farmers AND environment AND the whole society could benefit from such a „*change of setting*“.

DISEASES AND PESTS: Due to the attractiveness of the crop for farmers and industry and its strong extension in various regions, it also became attractive for all kinds of **unwanted organisms** living and feeding on the plant: Diseases and pests have gained undesirable importance in many growing areas. Therefore, the cultivation of oilseed rape is globally confronted with many challenges determining priorities of future rapeseed research and development.

Consequently, **insect pests and fungal diseases** are a serious threat of OSR today. Therefore, it is no surprise that more than one fourth of the contributed papers were submitted to this topic. Noteworthy, separate **workshops** have been organized in this field dealing with special pathogens and their control, i.e. on **Blackleg, Clubroot, and Sclerotinia**. I would like to particularly thank the organizers and also the participants of all workshops very much again for their activity.

At the same time, the issue of **protecting beneficial organisms** has become very important recently. So, it is all the more gratifying that the congress has concretely devoted itself to this question. The ideal way to **control diseases and pests** would be of course to protect beneficial organisms while still providing effective protection against yield limiting pest and diseases. And where

there are problems, there are also possible solutions which may be roughly summarized in **three categories**:

i) Technological advancement for safer use of pesticides:

For example, the smart idea of applying pesticides by a dropleg nozzle shows that technologies for protecting the environment can be developed allowing a more sustainable application of agrochemicals. Therefore, chemical plant protection must not be ruled out in the future.

- ii) **With regard to the use of effective biocontrols and alternative coatings,** this congress showed that the identification of such approaches have potential for future OSR production. Since not all techniques that seem promising in the laboratory would also work under field conditions and not necessarily make their way to practical application, such investigations of alternative agents are essential.

It was good to see that the idea of using beneficial fungi to prevent severe damage by clubroot and insects has been followed. To bring this forward a further and deeper understanding of **microbe- or insect -to-plant interaction** is clearly required; this topic will probably accompany us in the future.

- iii) The best resistance strategy would be that the plant protects itself. Therefore, the exploitation and systematic use of **plant genetic variation for resistance breeding has high priority**: Given that some of the pathogens, *Verticillium* for instance, cannot be cured by chemical agents and that there are declining chemical options for plant protection - particularly in the EU - it is urgently required to try and discover genetic determinants of resistance or tolerance which can be used in breeding for resistance to biotic stresses such as pests.

AGRONOMY: This IRC has probably been as much in context of **climate change** as no other congress before. The increasing frequency of extreme weather events makes us wonder whether and how **rapeseed farming needs to be reshaped** in the future. Although not every drought and every hot summer are attributable to climate change, on almost all continents weather extremes have

increased and somehow caused yield losses. In addition, the emergence of increasing environmental standards - taking the avoidance of nutrient (N) surpluses with their consequences on ecosystems and drinking water as an example – put further pressure on achieving high yield at justifying costs for environment. Several contributions on **plant physiology, nutrition** and challenges for crop management and a special **workshop dealing with the management under environmental stress** have improved our understanding for above and belowground plant architecture, and the development of specialized tissues under abiotic stress. In light of the fact that the strong **breeding progress achieved without any doubts** is not always reflected in yield on the farm level, it is quite important to rethink and **reshape the way OSR is cultivated and integrated in crop rotations** and how the management can contribute to convert the knowledge in higher yields and better products.

MUSTARD AND OTHER CRUCIFEROUS CROPS: Another novelty of the IRC has been the designation of a special session on mustards, reflecting their importance especially on the Indian subcontinent. I am not sure if this „**experiment**“ can be considered as successful. Rather, it deserves further consideration e.g. by the organizers of the coming IRC.

CONCLUSION

Given the **tremendous challenges** for OSR but at the same time the overwhelming growth of knowledge leading to **upcoming and useful technologies** providing solutions one could never imagine before, make me strongly believe that in four years from now the 16th IRC in Australia will become at least as interesting and inspiring as the last four days here in Berlin.

In view of the **growing population** and the increasing consumption, there is obviously a rising demand for products of oilplants like rapeseed. Therefore, OSR cultivation is expanding in various regions of the world, for example in eastern Europe and Russia. Nowadays, the crop is not just esteemed for its healthy **seedoil**, but the **RS meal** is also a valuable compound as feed not only for ruminants such as dairy cows but – as we have seen in several talks – is

more and more used as a **protein-rich feedstuff** for pigs and poultry. The local demand for non-GMO protein in Europe further boosts this development.

In addition, the **RS protein** may also become a valuable commodity for **human nutrition** as well. Changing consumer behavior causes a significant demand for vegetable protein products and opens more opportunities on sales market for OSR as ever before. This lets us believe that OSR will have indeed a ***flowering future*** in the feed and the food area and beyond.

- Better **exploitation of yield potential** in terms of farm yield: better adaptation of **cultivars** to abiotic stress and pathogens (better complementation of chemical and biological approaches)
- Develop **resilient agro-ecosystems** by increasing crop diversity and improving crop rotations (diversify cereal-centered agrosystems)
- Increase the **added value of oilseed rape** better exploiting the variety of valuable ingredients inside the rapeseeds; e.g. improve and use **RS protein** as a valuable alternative to animal protein.

I will not close my talk without thanking you all for your attention and all the people involved in the congress planning for their great input and tireless commitment!

Thank you very much for your kind attendance and valuable contributions.

With that I wish you a further eventful stay in Berlin and Germany, exciting field trips and finally: a good and safe way back home.