Summary of the Section on Diseases, Insects and Plant Protection

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Fifty-one presentations comprised of 10 lectures and 41 posters were given under the section on diseases, insects and plant protection. Presentors represented 11 countries. Of the very diverse subject matter covered, 23 dealt exclusively with some aspect of insect pests of rapeseed whereas 22 addressed problems of fungal diseases and six discussed research on plant protection involving both insects and plant pathogens.

An understanding of the presentations in plant protection and their relationship to rapeseed culture can be better gained by viewing the individual contributions in the conceptual framework provided below.

Rapeseed production can be viewed as comprising three interacting areas of activity each with broadly defined goals or domains. The first goal is that of <u>increasing yield</u> through the application of chemical fertilizers and pesticides and of enhancing the phenotypic response of yield through specific breeding such as the production of F_1 hybrids or intensive selection schemes. The second goal is that of imparting <u>special phenotypic qualities</u> to the crop through breeding characteristics such as altered chemical composition (e.g. glucosinolate content, oil and protein quality), plant morphology and disease and pest resistance. The third and possibly most important goal is that of ensuring for <u>stable production</u> through knowledgeable applications of crop ecology and prudent gene-development.

These production goals present dynamic interrelationships among themselves in that activities within one domain if executed without consideration of the consequences to another domain will result in an imbalance that may have serious consequences to the overall production of the crop. For example, the excessive uses of fertilizer may predispose the crop to particular pests or pathogens through enhancing the succulence of the foliage excessively. Similarly the genetic maximization of yield response, via breeding, to the enriched agricultural environment provided by chemical additives may also predispose the crop to biological hazards in environment such as pests, or to environmental hazards such as frost or drought stress. Likewise the alteration of the crop for specific attributes such as chemical quality, plant growth habit or resistance to specific pathogens may render the crop vulnerable to other new pathogens or pests. Changes in plant morphology can change the microclimate within the crop canopy such that new pest and disease problems arise. Introduction of genes for specific resistance to a pathogen will shift the pressures on the pathogen population toward selection for higher levels of virulence. Overall, reduction in the crop of compounds that are as biologically active as the glucosinolates is likely to establish substantial imbalances between the crop and those species of insects, and fungi which have evolved mechanisms for accommodating the glucosinolates in their own life strategies.

It is likely that the widespread deployment of cultivars of relatively homogenous genotype with significantly altered phenotype will introduce substantial genetic vulnerability into the rapeseed crop. The apparent widespread attention being given to the use of the 'Polima' and 'Ogura' cytoplasmic male sterility in F_1 hybrid rapeseed together with the continued reduction of glucosinolates should give breeders reason to carefully consider their objectives relating to long term stable production.

Long term, stable production can probably be best approached through the knowledgeable application of the principles of crop ecology and through the prudent deployment of rapeseed genotypes based on a knowledge of crop-symbiont coevolution.

Many of the presentations at this Congress in the section of plant protection, insects and diseases, directly or indirectly addressed the two major issues relating to long term, stable production; i.e., that of gaining more knowledge in the area of crop ecology and that of understanding the long term implications of resistance-gene deployment. There were a number of studies that reported on the relationship of insect populations to the rapeseed crop. The pest species studied varied depending on the country where the research was done however detailed attempts are being made to better understand how pest populations increase and spread in the crop. such studies will provide information that will be useful in determining the best strategies for chemical control. Important contributions to insect population studies were the reports on improved methods of trapping insects in the crop. Studies using pheromones and color attractants together with special design features show considerable promise. The research presented on the chemical constituents of Brassica species in relation to reproduction and growth of insects and fungal symbionts will be important guiding rapeseed breeders in the future. Within the area of insect-Brassica interactions a good start has been made in studying insect population growth at the local level. Such work must continue before more unified principles of crop- and pest-population dynamics can be understood.

The pathogens of rapeseed reported at this congress were largely fungal, with Alternaria, Sclerotinia, Leptosphaeria (Phoma), and Albugo assuming the greatest attention. Verticillium also appeared to be of concern to breeders in some areas of Northern Europe. Research on pathogens has largely centered on efforts to develop suitable disease screening methods for the selection of resistance. Promising methods appear to be under development for Alternaria and Sclerotinia and Leptosphaeria though there is greater need for efficiency and reliability in the methodologies. The potential for '*in vitro*' screening for resistance to *Leptosphaeria*, *Alternaria* and *Verticillium* through the use of pathotoxins hold considerable promise when coupled with techniques for cell and protoplast regeneration. Important studies on the epidemiology of *Sclerotinia* and *Alternaria* using innovative pathogen sampling methods were reported. Some of these studies when combined with the application of chemical treatments will provide the basis for more rational utilization of chemicals in the crop.

I would view all of the presentations in this section of considerable use to the goals of *high* and *sustained yields* of the crop. In general, however there is a greater need for studies on the relationship of specific cropping practices (e.g., rotational sequences, plant stand densities, chemical applications, etc.) to the population dynamics of both pests and pathogens. Only when these studies have been made will a more rational approach to the use of pest control chemicals and deployment of genetic resistance be possible.