Screening for resistance of triticale dihaploid and somaclonal lines to *P. nodorum*

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BACKGROUND

One of the destructive pathogens of triticale worldwide is *Parastagonospora nodorum*, a causal agent of Parastagonospora nodorum blotch (PNB) (Figure 1). PNB on average causes yield losses of 15–20% largely attributable to kernel weight reduction. Inoculum is usually more important in initiating the later phases of the disease, however, fungus carried on the seed is more likely to be responsible for septoria seedling blight. To control this disease conventional methods of breeding for resistance need to be supported by biotechnological ones, like somatic embryogenesis and androgenesis.

In this study, an effort was undertaken to compare variation response to *P. nodorum* among winter triticale somaclones, dihaploids and conventional cultivars.

Figure 1. Symptoms of glume and leaf blotch
Photos by S. Bartosiak

PLANT MATERIAL

A population of sixteen somaclonal and twenty dihaploid triticale lines from seven crosses (Table 1.) were used to test their resistance to *P. nodorum* under field conditions. During experiments three cultivar references were used: Borwo, Fredro and Pigmej.

TRITICALE CULTIVARS	
Algoso	Meloman
Borowik	Tomko
Borwo	Panteon
Cyrkon	

Table 1. Triticale cultivars used for crossings

METODS

- Experiment on one-meter plots in four replications were planted (Figure 3);
- Plants in disease free (fungicide sprayed) and inoculated plots in a single environment were grown;
- Three inoculations of plants were performed (concentration of *P. nodorum* inoculum 4 x 10^6 spores/ml);
- Rating of disease severity was done on leaves (Figure 2.), on scale:
  0-10% - resistant,
  >90% -susceptible.
- Analysis of reactions was conducted in ImageJ (Figure 2.).

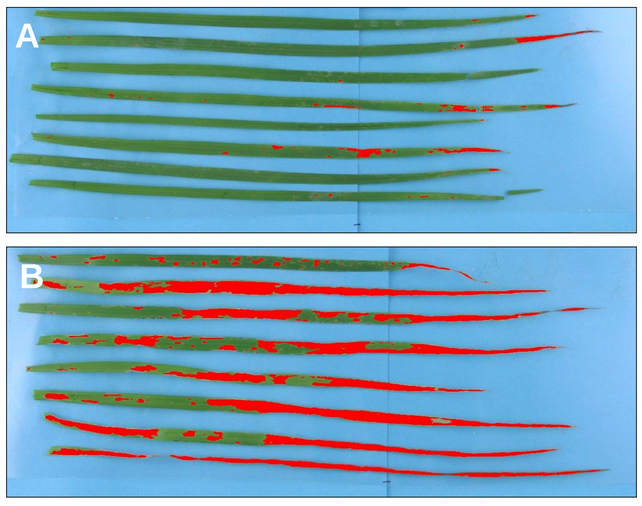


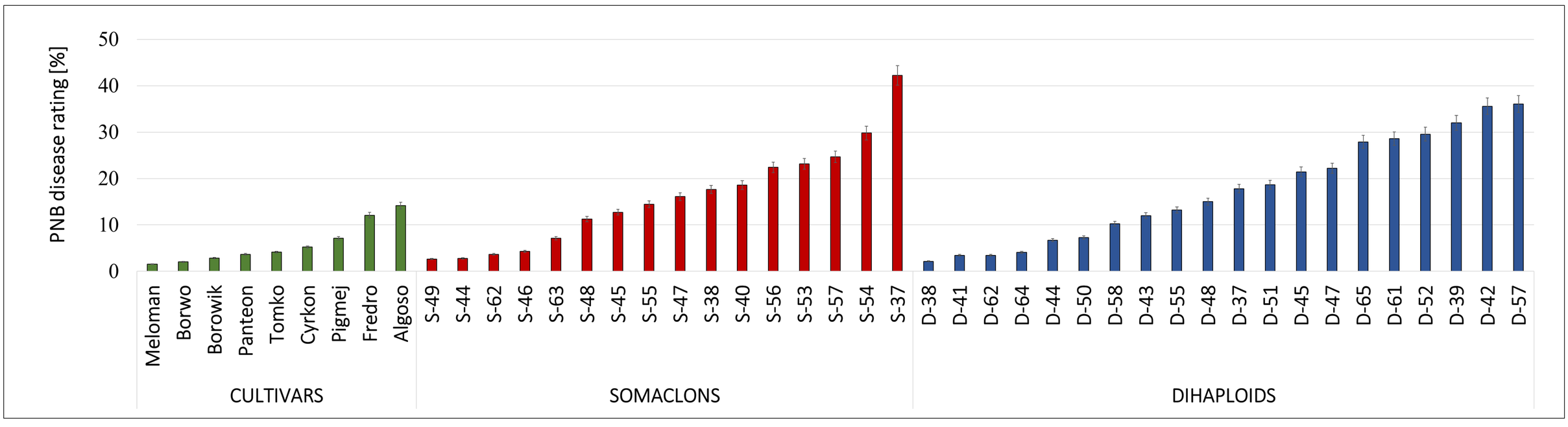
Figure 2. Coverage of leaves with chlorotic/necrotic lesions: A. Borwo; B. Pigmej

Figure 3. Experimental field pictures done from drones

RESULTS AND CONCLUSION

Differences between PNB response of plant leaves of somaclones and dihaploids for all components were statistically significant (Graph 1.). Higher resistance to *P. nodorum* was observed more often on leaves of somaclonal lines than on dihaploid ones. On average disease severity reached 16.4% on leaves of somaclones and 17.2% on leaves of dihaploids. Some of genotypes were showing low leaf infection, e.g. dihaploid D-41 (infection was 4%) and a somaclone S-49 (2%).

The results from this study suggest that dihaploid and somaclonal variation might be considered as an additional source of triticale natural resistance to the pathogen and it could be recommended to use in commercial breeding programs. Resistance breeding shows farmers, and plant breeders how to use a long-neglected technique to develop new cereal varieties with elevated natural resistance to pests and diseases.



Graph 1. Disease rating caused by *P. nodorum* on parental cultivars, somaclones and dihaploids

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