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## Searching for wheat varieties resistant to heat stress and with stable bread-making quality

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### Topic 3 Grain Breeding and Climate Change

#### **Title: Searching for wheat varieties resistant to heat stress and with stable bread-making quality**

Wheat is an essential resource for food and animal feed and the demand is increasing due to population growth. Wheat is facing a number of challenges worldwide, including the impact of climate change, which is causing instability in grain yield and quality. At the same time, there is a societal demand for decreasing the use of chemical fertilizers and pesticides for environmental reasons. Added to this are geopolitical disturbances such as the war between Russia and Ukraine, two major wheat producers and exporters.

Instability in yield and quality of the production, influenced by the harvest year and cultivation areas, is a major concern for wheat producers and industrial companies in transformation processes, such as bread-making. The Intergovernmental Panel on Climate Change predicts a worsening of climate change over the next decades, including a significant rise in mean temperature and more frequent heat waves during crucial wheat-growing periods. Thus, it is essential to improve our knowledge on the effects of climate change on wheat.

Several French research programs aimed at improving the stability of wheat yield and quality in the context of global warming. In particular the BreedWheat and HeatWheat programs have explored the genetic diversity of wheat and identified varieties resistant or sensitive to moderate heat stress applied after flowering, in terms of final grain weight. Association genetics was then used to identify chromosomal regions linked to grain weight under heat stress.

Moreover, the recently launched ClimaBoul project will compare the effects of post-flowering heat stress on the structure, composition and bread-making quality of grains from varieties with contrasted resistance to heat and varieties with contrasted bread-making stability. Both experiments in controlled and field conditions are planned with fine physiological and biochemical analyses during grain development.

These projects will provide key information to help breeding for new wheat varieties that are more resistant to heat stress, while maintaining their ability to be processed into French bread products of stable quality.

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