MÜLLER,K.J.;KUNZ,P.;SpIESS,H.H.;HEYDEN,B.;IRION,E.;KARUTZ,C.(2000): An overnational cereal circuit for developing locally adapted organic seeds of wheat. IN: ALFÖLDI,T.; LOCKERETZ,W.; NIGGLI,U. [editors]: IFOAM 2000- The World Grows Organic, Proceedings 13th International IFOAM Scientific Conference, Basel 28-31 August 2000, vdf Hochschulverlag Zürich, ISBN 3-7281-2754-X , p224.

An overnational cereal circuit for developing locally adapted organic seeds of wheat

Karl-Josef Müller[1], *Peter Kunz, Hartmut H. Spiess, Bertold Heyden, Eckart Irion, Christine Karutz*
[1] *Gesellschaft für goetheanistische Forschung eV, Darzau Hof, 29490 Neu Darchau, Germany*

Keywords: *biodiversity, locally adapted varieties, wheat breeding, baking quality, gluten content*

Introduction

Quality criteria for organic winter wheat in Germany is different from those of 20 years ago. Today, fine flour is in demand for baked products. Years ago only wholemeal was in demand. Fine flour requires a high gluten content produced under different growing environments. Five years ago five initiatives started testing old and new varieties and new developed breeding lines by an interchange at each location; through this work new criteria for wheats for organic farming conditions began to develop and an information exchange dealing with the breeding problems. Soon it was apparent that it was impossible to have one variety that was suitable for the diversity of organic growing conditions in the entire region. For example, the availability of manure depends on the number of cows per hectare which is dependent upon the fodder harvest which is dependent upon the rainfall, temperature and soils conditions. All the conditions affect wheat quality even directly.

Material and method

Depending on local conditions and the volume of seed available from new breeding lines 2-4 replicates of a plot size of 2-10 m² were planted on each location. The breeding lines were compared to conventional baking wheats. One of the most widely used baking wheats for organic farming conditions in Germany is the registered variety "Bussard". It was used as a comparison wheat for all years.
The growing conditions in the whole region were diverse. In Lower Saxony (location:Darzau) there are low fertility sandy soils with about 600 mm rainfall per year. North of Frankfurt (Dottenfelderhof) rainfall is also low but the farm is located on damp loams with more organic fertilizer available. In Grub (east of Munich) the land is wet with sandy loam soil. Near Lake Konstanz and in Switzerland rainfall and air moisture are high, soils loamy.

Results and discussion

Yield from standard variety "Bussard" differed in all locations over the various years ranging from 2.5-7.5 t ha^{-1} (fig.1). Wet gluten content varied from 15-30%. Good baking quality with high yield is no guarantee for producing the same quality under low yielding. Depending on locations of the participants, their new bred varieties are higher in gluten content where 'Bussard' has less than 20% (Darzau), or they can have a higher yield if gluten content has a regular high percentage (Dottenfelderhof), or they can be higher in both yield and gluten content (Lake Konstanz) (fig.2). Varieties with a strong light competition characteristic on poor grounds (Darzau) have no lodging resistence in a high yielding environment (Dottenfelderhof), where they will grow very tall. A resistance against head scab (*Fusarium sp)* is important for a wheat that follows maize in rotation as in Switzerland; not necessarily in environments with poor soils and low rainfall. *Septoria* on ears is an important problem east of Munich. Mildew considerations should not be neglected but the pressure is not as high as under conventional farming. Common bunt (*Tilletia caries*) is the most important disease problem for organic seed production in all areas. Developing exactly the same resistances with marker assisted selection for many varieties is the prerequisite for loss of resistance after a few years. More biodiversity is required for organic farming conditions. The cereal breeding group has started to develop locally adapted vareities for specific areas.

Fig.1: Winterwheat 'Bussard' on 5 areas in 5 years

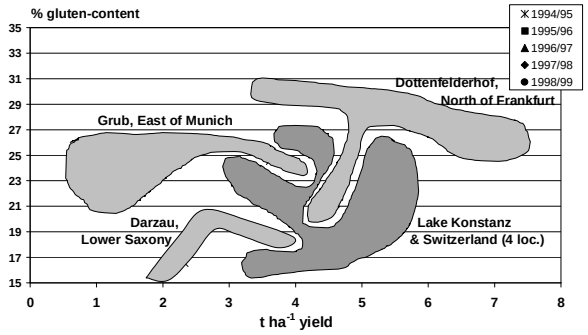
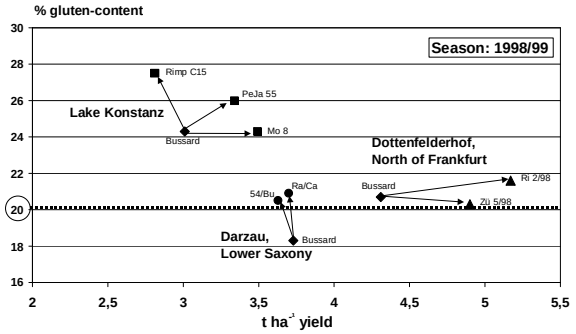


Fig.2: Best regional breeding lines related to 'Bussard'



Conclusion

Organic farming and consumers demand more varieties of locally adapted wheat.