



VARIETY TRIALS 2006 EVALUATION

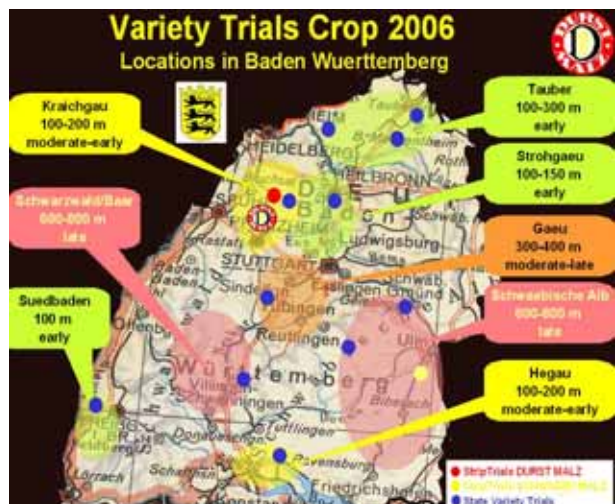
1. Locations and Conditions

Following past years' tradition DURST MALZ and SCHWABEN MALZ carried out variety trials in South West Germany (Baden Wuerttemberg). The Strip Trials, with an assortment of 10 varieties were planted on two locations with different agricultural and climatic conditions:

- **Kraichgau** (Bretten – early harvest, low altitude) and
- **Schwaebische Alb** (Erbach – late harvest, high altitude), for details refer to picture (1).

At Kraichgau, two fertiliser doses (72 and 102 kg N/ha) were applied, resulting in lower and higher protein levels. In addition a part of the strips remained without fungicide spraying to evaluate the resistency. Plant protection and soil preparation was done according to normal agricultural practice for these two regions.

Reference varieties were Braemar and Belana. For more detailed view on yield, the Federal State Variety Trials of Baden Wuerttemberg and Rheinland-Pfalz, are in this evaluation.



Picture(1) Trial Locations

The varieties tested, the breeders and the year of approval are shown in Picture (2).

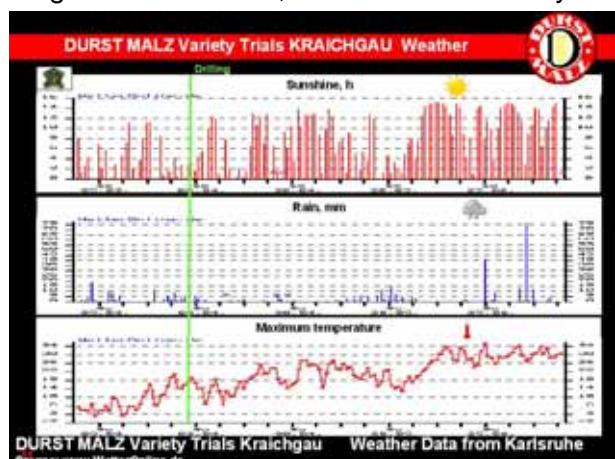
Variety	Breeder	Release
Braemar	New Farm Crop	Reference
Anaconda	Ackermann	
Belana	Nordsaat	2004
Christina	SW-Seed	EU
Henley	Nickerson	
Marthe	Nordsaat	2005
Poet	SW-Seed	Dez 06
Power	Streng	2005
Quench	Syngenta	Dez 06
Sebastian	Streng	EU

Picture (2) Varieties tested

The assortment included the two varieties of the final round of “Berliner Programm”, Marthe and Power, the recently released variety Quench and the EU approved varieties Christina, Sebastian and Henley. Anaconda did not pass the final round of the approval procedure by German authorities. Data concerning vegetation period and observations at different stages are available on www.durst-malz.com. All varieties have been malted by the DURST MALZ pilot malting, according to the common German standard regime:

- Steeping: 2 days
- Germination: 4 days
- Maximum moisture: 46%

The weather during vegetation period exposed extreme climatic conditions to both locations. Due to the long and cold winter, both sites could only be drilled about 3 weeks later than usual (Kraichgau April, 1st, Schwaebische Alb April 24th).



Picture (3) Weather data of Kraichgau site (1)

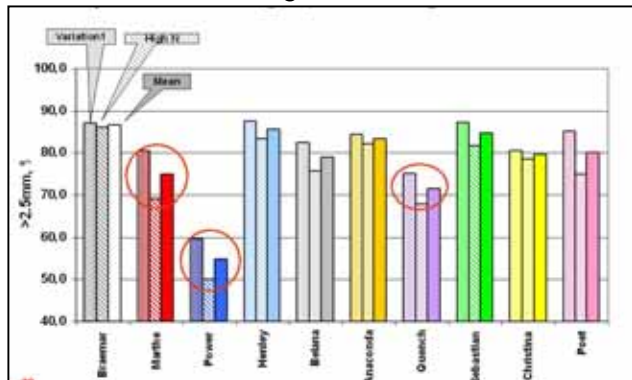
The development of the plants was delayed by initial cold temperatures. In Kraichgau only few rain falls could be noticed. Rain at the end of June and the commence of July could moderate the effect of hot and dry weather of the first three weeks in June. The water saturation of the soils was scarce but still sufficient. Harvest in Kraichgau could take place at the end of July under dry conditions. The location Schwaebische Alb suffered severely from the persistent rainfalls in the first weeks of August. Harvest could be completed in the last week of August. Weather damage, pregermination and sprouting affected the quality drastically, here. This also had an adverse effect on malt quality.



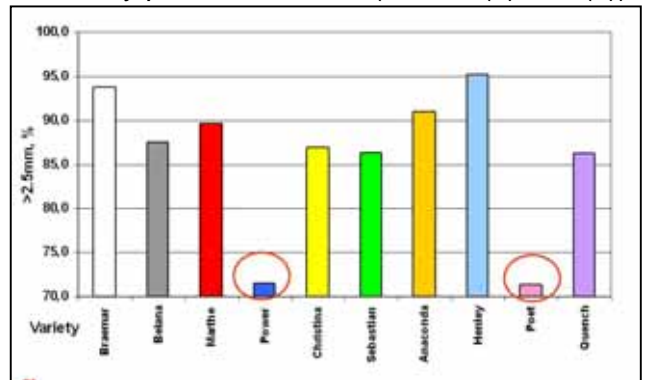
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2. Barley Quality

Screening above 2.5mm is relatively small at Kraichgau, due to the hot temperatures and missing rain. Power, Quench and Marthe result in very poor or poor values here. At Schwaebische Alb the level is within the normal range. Power and Poet, however, have very poor values here (Picture (4) and (5)).

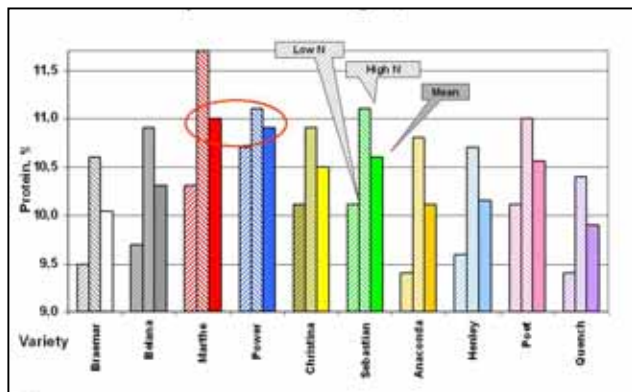


Picture (4) Screening >2.5mm Kraichgau

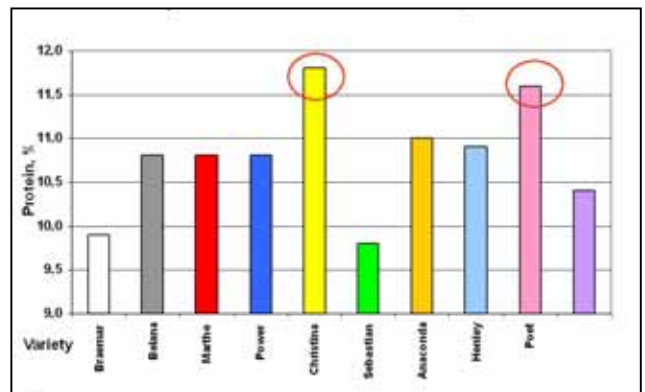


Picture (5) Screening >2.5mm Schwaebische Alb

Protein of Kraichgau is on a very low to low level. The trial with higher N resulted in higher Protein values. Samples of Schwaebische Alb show values are at a normal level (Picture (6) and (7)).



Picture (6) Barley Protein Content Kraichgau

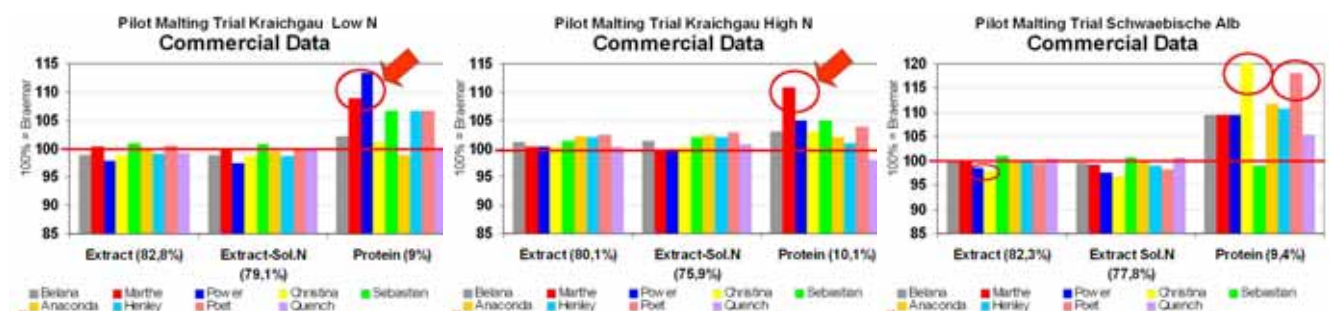


Picture (7) Barley Protein Content Schwaebische Alb

3. Malt Quality

The following results are given as per cents relative to Braemar which accounts for 100%. The values for Braemar are shown in brackets on the x-axis per each parameter.

Extract values of most varieties are on the level of Braemar for both locations. Power, affected by poor screenings above 2.5mm has lower extract at Kraichgau Low N and Schwaebische Alb. At Kraichgau Low N and at Schwaebische Alb values of Christina are low. At Schwaebische Alb this is caused by higher Protein.



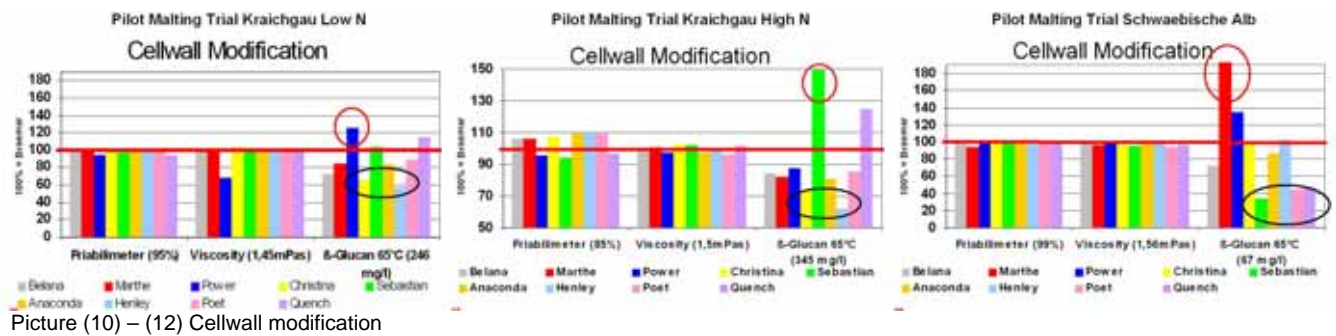
Picture (7)-(9) Extract, Extract, Soluble Protein-free and Malt protein



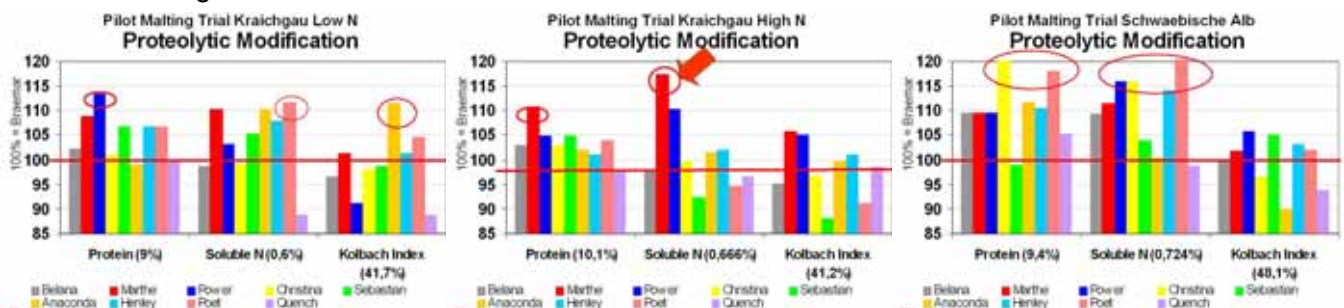
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The level of extract is the highest at Schwaebische Alb. This reflects the share of sprouted and pregerminated grains which increases Proteolytic Modification and adds some enzymatic activities, not present in sound barley.

Cellwall Modification is on a high level with all varieties. A few outliers can be found for β -glucan in the isothermal 65°C mash with Marthe at Schwaebische Alb and Power at Kraichgau Low N site. This is most likely due to the samples and not a variety related property. Some varieties expose extremely low values of β -glucan, however there is no uniform tendency to be observed. The sprouted barley from Schwaebische Alb results in very good cytolytical properties. Most likely this is due to premalting on the acre and additional enzymatic activities.

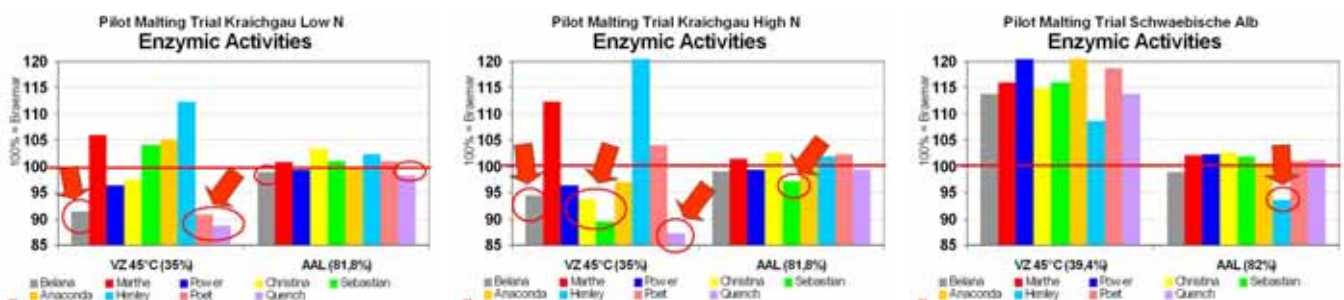


Proteolytical Modification has to be monitored rather by Kolbach Index (=ratio of Soluble N and Total Protein) than by Soluble Nitrogen due to the fluctuating figures of protein. All varieties show a relative good balance between proteolysis and cytolysis. The higher figure found at Schwaebische Alb is due to the sprouting and pregermination. Anaconda has a high value at Kraichgau Low N, however a limited proteolysis at Schwaebische Alb, which leads to the conclusion that this deviation is related to sampling or micromalting.



Enzymatic Activities reflected by AAL and Hartong VZ 45°C, show slightly lower values in case of Belana. Quench tends to low VZ 45°C values in particular at Kraichgau. The high Proteolysis of Schwaebische Alb, caused by pregermination and sprouting promotes VZ 45°C and results in high values for all varieties.

AAL of Sebastian, Quench and Henley are low, in single cases only. A varietal property is unlikely.

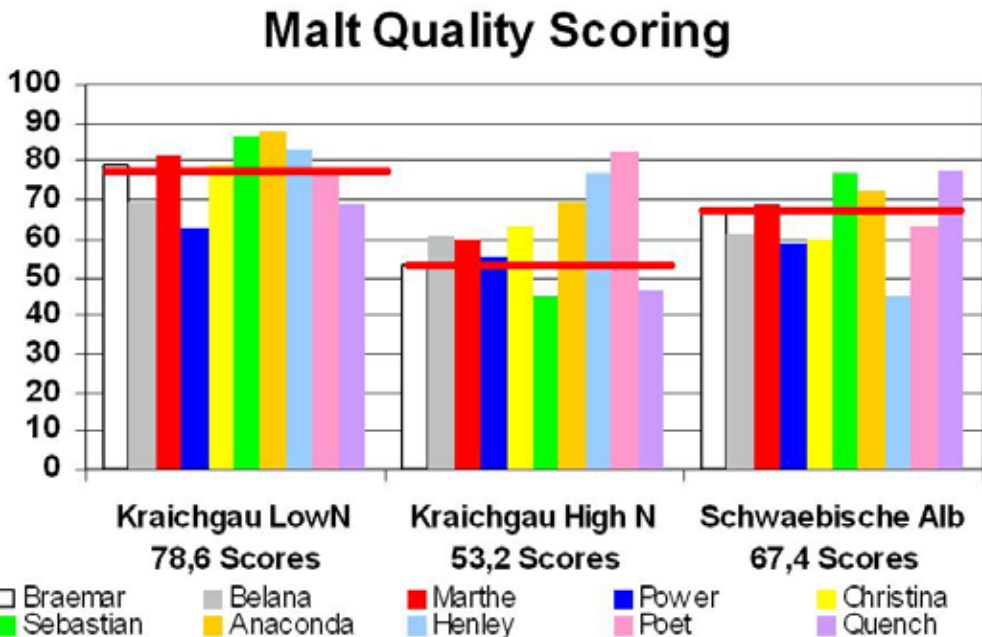




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4. Malt Quality and Scoring

Summarised the malt quality evaluation, according to the DURST MALZ Scoring System, shows the following results:



None of the varieties can obtain prominent scores at all locations and variations.

In average of all three locations Anaconda achieves the highest scores, followed by Poet, Marthe, Sebastian, Henley and Christina (in descending order). The remaining varieties are below the scores of Braemar.

Picture (19) Scoring

5. Summary and Conclusion

All quality and agronomic results are summarised in the following table (Picture (20)). Positive and negative marks are given only in case of significant differences as compared to the other varieties. The figures for yield are taken from Federal States Trials of Baden Wuerttemberg and Rheinland Pfalz. The sites there, in addition, are splitted up into early and late locations ((2) and (3)). Reference, in that case,

Variety	Ripening*	Yield*				Protein*			Fraction >2.5mm		Extract			Cellwall Modification			Protein Modification			Hartong VZ45			AAL		
		FST BW early	FST BW late	FST RLP early	FST RLP late	ST Kraichgau	ST Alb	FST BW	SV Kraichgau	SV Alb	ST Kraichgau	ST Alb	FST BW	ST Kraichgau	ST Alb	FST BW	ST Kraichgau	ST Alb	FST BW	ST Kraichgau	ST Alb	FST BW	ST Kraichgau	ST Alb	FST BW
Belana	5	0	+	+	++	0	-	0	0	0	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marthe	5	0	+	+	+	-	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Power	5	0	0	+	++	-	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sebastian	6	0	+	+	+	0	0	+	+	0	+	+	+	+	+	+	+	+	+	0	0	0	0	0	0
Anaconda						0	-		0	0	+	+	+	+	+	+	0		-	+		0	+		+
Christina	5	-	0	+	0	0	+	0	0	0	0	-	0	0	+	0	+	0	0	0	0	0	0	0	+
Henley						0	-		+	+	0	0	0	0	0	0	+	0	0	0	0	0	0	+	+
Poet						0	-		0	0	+	0	+	0	+	0	+	0	0	0	0	0	0	0	+
Quench	6					+	0		-	0	0	+	0	+	0	+	0	+	0	0	0	0	0	-	+

are the varieties Barke, Braemar and Auriga. The classification for Ripening is taken from the Descriptive List as issued by German authorities (4). A value higher than 5 is not favourable, in particular for the late harvesting regions.

FST = Federal State Trials	ST = Strip Trial	Kraichgau = early harvest Alb = late harvest
BW = Baden Württemberg RLP = Rheinland Pfalz	*Sources: (2), (3), (4), (6)	
+	-	o
positive performance (low protein or Kolbach others: higher = better)	negative performance (high protein or Kolbach, others: lower = worse)	Average blank: no data

Picture (20) Summary and evaluation of all agronomic and quality data



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As to the two varieties included in the final round of the "Berliner Programm", Marthe provides better malt quality than Power. Yield-wise Marthe gives more even results. Power obviously tends to small grains which is crucial for the early harvest regions.

Among the two varieties having applied for approval in December 2006, Anaconda did not succeed, although in these tests the malt quality is very good. The other variety, Quench, finally obtained an approval. It has good malt quality. However a tendency towards small kernel size could be observed and the ripening is late.

The other varieties, not yet approved or approved within the EU, expose favourable results for Henley with good malt quality and good grain calibration. Christina has low malt extracts and yield is fluctuating. Poet also seems to form small sized grains and has a tendency towards higher protein contents..

6. Outlook

DURST MALZ and SCHWABEN MALZ will continue with the trials in 2007 and will extend them by a third location in the Midwest of Germany.

In addition a strip trial with five winter malting barley varieties is drilled at Kraichgau and Schwaebische Alb, as well. Apart from the reference variety Vanessa, Malwinta, Wintmalt, Nickela und Manurewa are tested. Suitable winter malting barley can be an ideal alternative, in particular for the early harvesting areas where the global warming shifts temperatures to the high end, already in June. At that time the winter barley has already finished grain filling and is ready for ripening.

DURST MALZ will support the "Berliner Programm" by growing new varieties in commercial scale upon request.

7. Thanks!

Hubert Braun and Anton Moll did an excellent job in caring about the strip trials and observing the development very thoroughly. Many thanks to them and not to forget also to the breeders for providing the seed material and their support.

8. References

- (1) www.wetter-online.de
- (2) Versuchsberichte Pflanzenproduktion Baden-Württemberg 2006, Heft 7/2006, LUFA Augustenberg
- (3) Versuchsergebnisse Landesortenversuche Sommerungen Ernte 2006, Dienstleistungszentrum RNH, Bad Kreuznach
- (4) Beschreibende Sortenliste, Biologische Bundesanstalt