From Oats to Oat Drink

PLANT-BASED FOOD GRANT

Evaluating the **pOATential** of different oat varieties for oat drink production


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Aim of the project

Our goal is to **identify ≥3 oat varieties with optimal properties** for beverage use for both organic and conventional oat-drinks.

Background

The POATential project investigates how **oat variety and location/management system** (organic and conventional) influence raw-material properties that drive oat-drink performance.

We address batch-to-batch variability — by **screening 12–21 varieties** and mapping **variety × management × processing** effects on both **functional** and **sensory** outcomes.

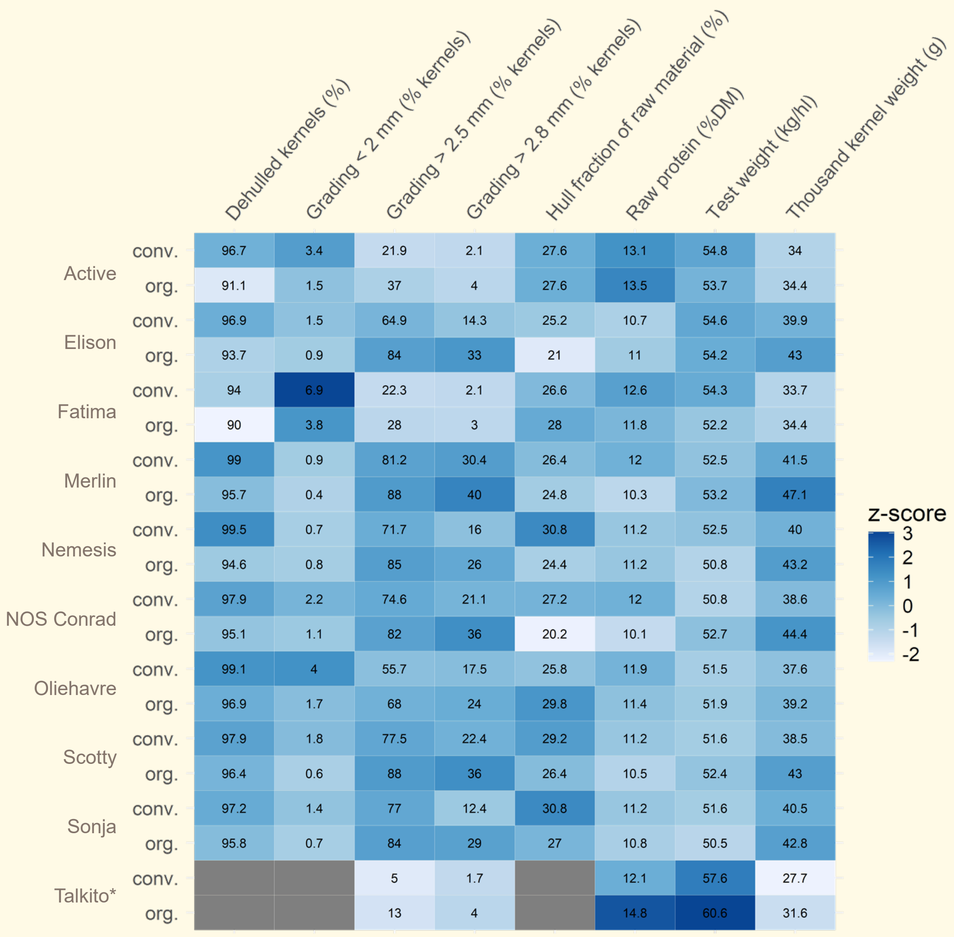
Conclusion & Outlook

Clear differences were found among oat varieties, while location/management system had less impact — **highlighting the importance of variety selection for optimizing plant-based drink quality.**


Picture: iStock

Cultivation parameters: Heatmap of the impact of management system/location and variety.

→ Varietal differences in kernel size, grading, dehulling ability and raw protein.



*Naked oat variety

Figure 1: Heat map showing z-score (color) and actual measures (numbers) of the management parameters for the different varieties and cultivation systems.

Sensory analysis: Descriptive profiling (aroma, taste, visual, mouthfeel, texture) on oat grains (later also oat drink).

→ Varieties showed different profiles with 14 out of 20 being pleasant.

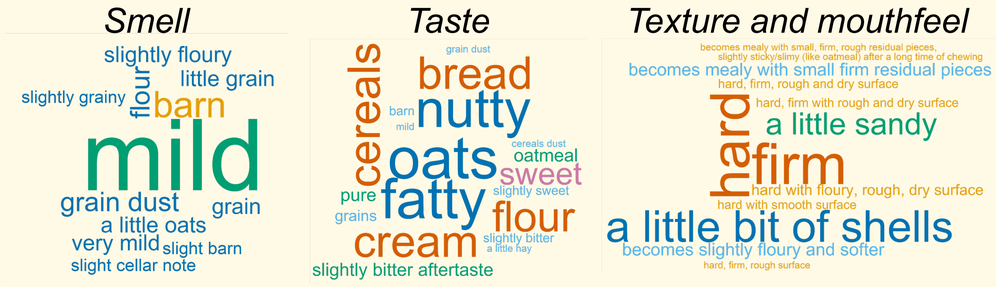


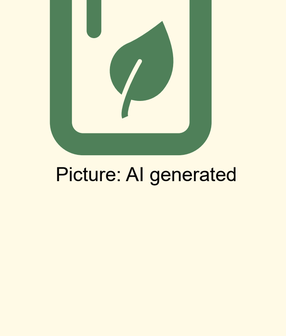
Figure 2: Word cloud of the words used to describe the smell, taste and texture and mouthfeel of the oat grains after harvest. Larger fonts translates to a more frequent usage of those words.

Experimental design

- **Screening of 12–20 oat varieties**; 6 selected for pilot processing.
- Cultivation under organic and conventional management (10 varieties, 2 locations (1 organic, 1 conventional)
- Processing steps: cleaning, dehulling, heat inactivation (lipase/peroxidase), milling, oat base production.

Further Analysis

- **Functional properties of oat drink base:** Viscosity, sedimentation, foaming.
- **Sensory analysis of oat drink**


Picture: AI generated

Standard composition: Protein and fat.

→ Differences among varieties, but not so much between location/management system.

Tabel 1: Fat content determined according to Bligh and Dyer principle, protein by DUMAS N X 6.25 and protein distribution by SDS-page and LC-MS/MS. ions. Means values as g/100 g and standard deviations (*n*=2)

Variety	Management	% fat	% Protein	Prolamin	α-Globulin	β-Globulin	Glutelin	Albumin
	conv.	7.03 ± 0.19	15.3 ± 0.02	18	35	29	7.7	11
Active	org.	6.37 ± 0.07	15.3 ± 0.02	14	40	31	5.2	10
	conv.	5.82 ± 0.01	11.2 ± 0.06	16	33	29	9.4	13
Elison	org.	5.75 ± 0.01	11.3 ± 0.84	15	37	32	5.7	10
	conv.	10.26 ± 0.17	13.6 ± 0.12	19	36	27	9.2	8.1
Fatima	org.	10.86 ± 0.06	12.7 ± 0.03	15	38	33	5.3	8.8
	conv.	5.81 ± 0.09	12.0 ± 0.08	15	32	32	8.2	12
Merlin	org.	5.50 ± 0.19	11.8 ± 0.20	15	36	33	5.7	11
	conv.	6.01 ± 0.09	11.8 ± 0.06	17	35	30	6.3	12
Nemesis	org.	5.21 ± 0.21	11.7 ± 0.41	17	38	29	5.4	10
NOS	conv.	5.57 ± 0.25	11.2 ± 0.06	20	32	29	10	9.3
Conrad	org.	5.33 ± 0.15	11.1 ± 0.31	18	37	30	5.2	9.3
	conv.	8.13 ± 0.33	13.1 ± 0.15	21	31	31	8.5	8.4
Oliehavre	org.	8.05 ± 0.07	12.9 ± 0.01	15	40	33	4.6	7.6
	conv.	5.36 ± 0.00	10.9 ± 0.01	19	34	28	8.5	11
Scotty	org.	5.23 ± 0.19	11.4 ± 0.15	15	36	31	6.1	12
	conv.	5.98 ± 0.14	12.1 ± 0.13	17	37	28	7.7	10
Sonja	org.	5.93 ± 0.05	12.3 ± 0.03	17	38	32	6.3	6.9
	conv.	5.98 ± 0.04	13.2 ± 0.72	16	37	35	5.2	7.6
Talkito	org.	5.63 ± 0.25	14.0 ± 0.25	13	40	34	5	7.5

Protein solubility after heat inactivation: The pH of the medium is a crucial factor for protein solubility. Protein solubility was pH-dependent and was also significantly affected by NaCl addition ($p<0.05$). Heat treatment reduced protein solubility by approximately 50 %, likely due to protein denaturation and aggregation.

→ Protein solubility is expected to impact emulsification performance and creaming.

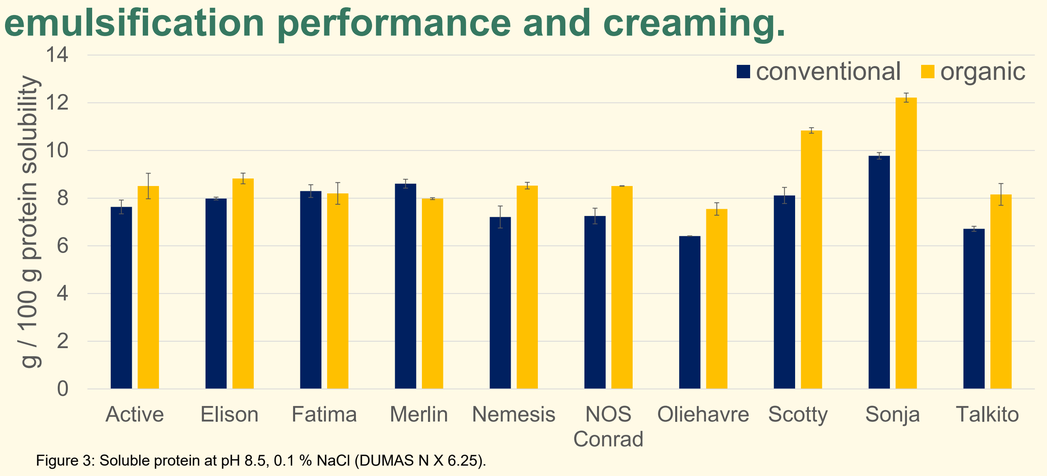


Figure 3: Soluble protein at pH 8.5, 0.1 % NaCl (DUMAS N X 6.25).

Lipid class distribution: Ratio of polar/non-polar lipids, affecting creaming and stability.

→ Non-polar lipids are the dominant fat fraction in oats, accounting for roughly 46 – 66 % of the total fat.

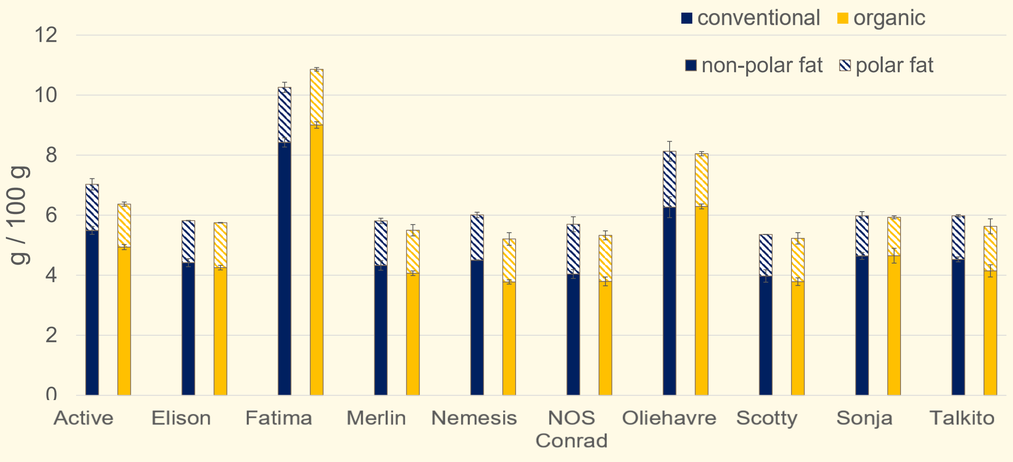


Figure 4: Lipid class distribution of oat variants g/100 g. Method non-polar fat content extracted with P-ether/diethyl ether (90:10) and polar fat content extracted with diethyl ether.

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