

# Combining Improved Aroma, Taste and Fibre Content in a Wheat Population Based on Landraces and Modern Wheat Cultivars



C. Brabant<sup>1</sup>, Beate Schierscher-Viret<sup>1</sup>, Valérie Vincent<sup>2</sup>, Dario Fossati<sup>1</sup> and Etienne Bucher<sup>1</sup>

<sup>1</sup>Agroscope, CH-1260 Nyon; [www.agroscope.ch](http://www.agroscope.ch) <sup>2</sup>Groupe Minoteries SA, CH-1523 Granges-près-Marnand, [gmsa.ch](http://gmsa.ch)

## Introduction

Improving the health-promoting properties (e.g. fibre content) of wheat will not result in improved consumer health if people don't like, and thus won't eat, the end product (the bread). Consumers want bread with a pleasant flavour – a result of the combination of texture, taste and aroma.

## Materials and Methods

14 modern wheat cultivars and 66 landraces, mainly from Switzerland, were studied in terms of:

- Agronomic value (yield, resistances) (Fig.1)
- Breadmaking quality (Zeleny, protein content, farinograph, extensograph, amylograph, gluten content and baking tests)
- Soluble and insoluble fibre content
- Sensory analyses (consumer panel and expert panel)
- High-molecular-weight glutenin subunits (HMW-GS), determined by SDS PAGE electrophoresis.



Fig. 1. Multiplication in the field over a two-year period of 80 varieties from the Agroscope National Gene Bank

## Results

Major differences in terms of [agronomic value](#) were found between varieties. Low lodging resistance and low yield were the main weaknesses of landraces.

### Breadmaking Quality

The rheological tests showed that landraces generally have a more extensible dough and a slightly higher gluten content than modern cultivars. Landraces and modern varieties contain the same glutenins, but in different proportions: landraces more often have HMW-GS Glu-D1a (2+12), which impart greater elasticity to the dough. The loaves produced vary significantly in size (from 210ml to 570ml) according to the variety, and many varieties achieve a high volume (Fig. 2).



Fig. 2. Loaves produced from different wheat varieties (Rasica, Les Haudères, Nendaz, Visp, Verna) are compared in terms of size of slashes as well as shape, crust and crumb color, crumb porosity and texture.

### Organoleptic Quality

A good correlation was found between the two assessment panels. Many varieties were rated as having a highly appealing flavour. The hedonic sensory analysis distinguishes varieties according to smell, taste and mouth-texture scores (Fig.3). The highest-rated varieties had more of a "browned-butter" and "fruity-fermented" flavour.

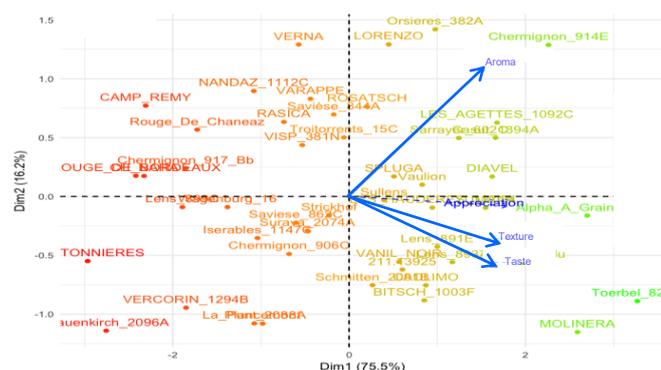


Fig. 3. Principal component analysis based on hedonic sensory analysis ratings. (green: high ratings, red: low ratings).

### Fibre

Soluble fibre ranged from 1.6% to 3.7% and insoluble fibre from 4.4% to 10.9%. The modern varieties **Molinera**, **Lorenzo** and **Diavel** have the highest fibre content. Correlations were found between total fibre and quality parameters, such as Zeleny sedimentation test ( $r=0.73^{**}$ ), flour water absorption ( $r=0.74^{**}$ ) and loaf volume in pan ( $r=0.65^{**}$ ).

### Prospects

Twenty crosses between the best landraces and modern cultivars were made in order to breed novel cultivars combining excellent taste, the highest fibre content and high disease resistance. At the same time, mixing F2 grains from these crosses should result in a population with a "good flavour and high fibre content". This population will evolve under different conditions, through on-farm breeding. Over the long term, we expect it to produce new, locally adapted landraces.