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# HERITABILITY OF THE SENSORY CHARACTERISTICS OF APPLES – A CASE STUDY WITH TRADITIONAL CULTIVARS AND NEW CROSSES

## INTRODUCTION

Breeding of fruit aims to transmit the favourable properties of the progenitors, whether related to productivity, resistance or sensory properties to the offspring. In the present study, we did a preliminary examination on the heritability of appearance, odour, texture and flavour of apple cultivars and their crosses currently cultivated in Finland.

## DATA COLLECTION

### APPLES

Three cultivars ('Huvitus', 'Melba', 'Lobo') alongside their eleven crosses bred by Agrifood Research Finland (MTT) were included in the study (Table 1). All three are widely used in the breeding programs in Finland.

Early season cultivar 'Huvitus' (H) is an old local seedling of domestic origin. 'Lobo' (L) is a late and 'Melba' (M) a mid season cultivar. Both originate from Canadian cultivar 'MacIntosh'.

### EVALUATION

The apples were evaluated with generic descriptive analysis ( $n=13 \times 4$ ). The lexicon consisted of 15 attributes: three related to appearance (red, green, surface wax), two to odour (intense, fruity), five to texture (hard, toughness of the skin, crispy, mealy, juicy) and five to flavour (intense, diverse, sour, sweet, astringent). These are coded in Figures 2 and 3 with prefix A, O, T and F, respectively.

Table 1. Cultivars in the study. The codes are used in Figures 2 and 3.

Cultivar	Code #	DD5 *	Origin
Pirja	HM	972	MTT
Vuokko	MH1	1100	MTT
Huvitus	H	1026	Finland
Maikki	MH2	1080	MTT
Petteri	LH1	1120	MTT
Big Melba	MH3	1140	MTT
Samo	MH4	1159	MTT
Melba	M	1192	Canada
Sandra	LH2	1195	MTT
Jaspi	LH3	1200	MTT
Heta	LH4	1200	MTT
Pekka	LH5	1230	MTT
Tobias	LH6	1235	MTT
Lobo	L	1302	Canada

# H = 'Huvitus', M = 'Melba' and L = 'Lobo'.

\* DD5, the cumulative heatsum needed during growing season.

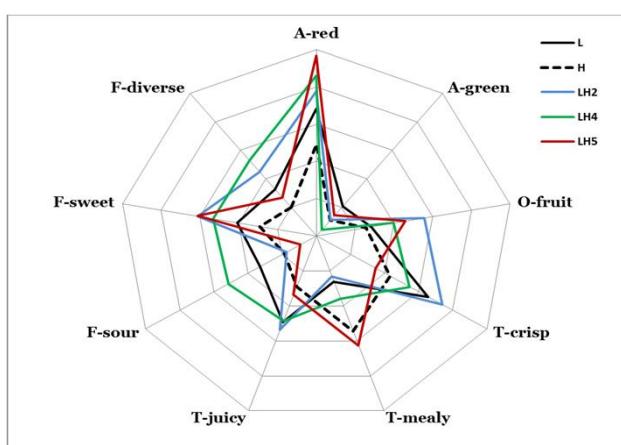


Figure 2. Profiles with selected attributes of three crosses of 'Lobo' x 'Huvitus',  $n=13 \times 4$ , except for 'Huvitus',  $n=13 \times 2$ . Cultivar codes are explained in Table 1.

## REFERENCES

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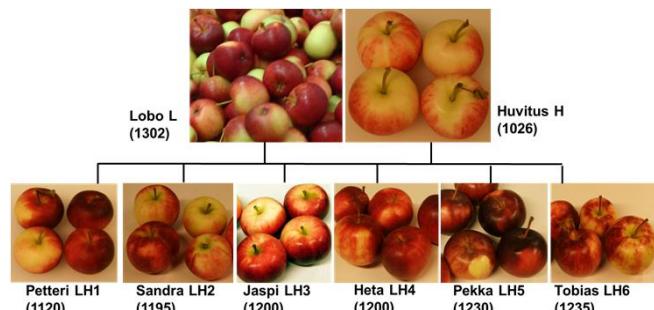


Figure 1. Crosses of 'Lobo' x 'Huvitus' with their DD5, the cumulative heatsum needed during growing season.

## RESULTS

The crosses LxH were high in redness (Figures 1, 2). The intensities of fruity odour and most of the flavour attributes were higher than in the parent cultivars while texture attributes varied more.

The textural attributes loaded mainly on the first and third principal components (PC) and the odour and flavour attributes in the second PC (Figure 3). In most of the crosses of LxH, odour and flavour intensities were higher than in the parents. Except for LH3, all crosses were sweeter than the parents L and H. L and the cross LH6 resembled each other greatly.

The crosses MxH were sweeter and less sour than M, although all were fairly similar to M. Their texture was juicy and crispy and less mealy than most of the crosses LxH. The families of LxH and MxH loaded in two separate groups in the graph (Figure 3).

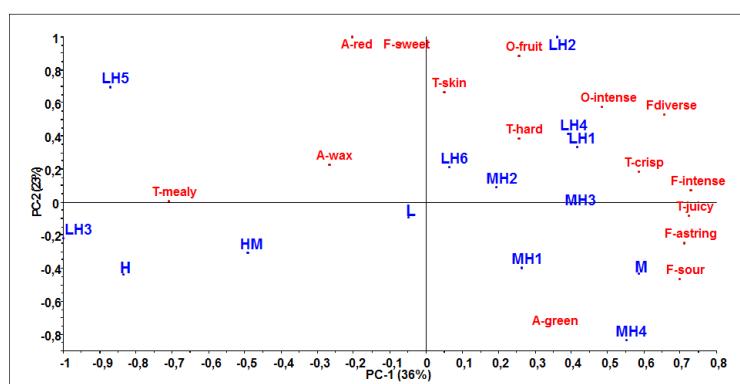


Figure 3. Score plot obtained from principal component analysis of profiling data (PC1 and PC2). Cultivar codes are explained in Table 1.

## CONCLUSION

This preliminary study shows a great diversity of attributes across the crosses and their progenitors. Sensory attributes may appear in the offspring in a stronger or weaker intensity than in either of the parents.

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