OS & SBP

SCIENCE

FERRERO®

# Results of the 2015 sample analyses

28 Mar. 2017

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# Full sample test

- During autumn 2015, the UofG harvested, classified and dried hazelnut samples from 10 cultivars that grow in the Simcoe Research Station.

- Samples were sent to Ferrero Quality Laboratories in Alba (Italy) to carry out a full sample test on:

| | |
|---|---|
| **In-shell merceological evaluation** | Weight, shape, caliber |
| **Kernel merceological evaluation** | Weight, shape, caliber, defects, blanching. |
| **Chemical analysis** | Pesticides, Cd, Pb, Aflatoxins, % of oleic acid |
| **Organoleptic evaluation** | Chopped raw and roasted |

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# Samples and Cultivars

| BUTLER | C16 | C28 | DELTA | G186-M |
|---|---|---|---|---|



| GAMMA | GENEVA | HALL'S GIANT | JEFFERSON | SLATE |
|---|---|---|---|---|

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# Merceological analysis

| Caliber ⌀ mm | BUTLER | C16 | C28 | DELTA | G186-M | GAMMA | GENEVA | HALL'S GIANT | JEFFERSON | SLATE |
|---|---|---|---|---|---|---|---|---|---|---|
| **16** | 18,9% | / | / | / | / | / | / | 3,4% | / | 3,5% |
| **15** | 32,8% | 1,56% | / | / | / | 1,9% | 13,24% | 23,86% | 24,1% | 22,2% |
| **14** | 31,63% | 14,77% | / | 13,00% | 8,19% | 33,08% | 36,93% | 49,10% | 45,53% | 47,71% |
| **13** | 11,95% | 38,02% | 8,52% | 47,49% | 19,18% | 49,74% | 35,35% | 16,85% | 22,29% | 21,11% |
| **12** | 4,62% | 32,85% | 41,59% | 34,52% | 31,72% | 13,82% | 10,40% | 6,75% | 8,10% | 5,55% |
| **11** | / | 8,29% | 36,52% | 4,99% | 23,56% | 1,43% | 4,08% | / | / | / |
| **10** | / | 4,50% | 10,5% | / | 12,68% | / | / | / | / | / |
| ***<10*** | / | / | 2,9% | / | 4,7% | / | / | / | / | / |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **>14** | 51,80% | 1,56% | 0,00% | 0,00% | 0,00% | 1,92% | 13,24% | 27,29% | 24,08% | 25,64% |
| **12-14** | 48,20% | 85,64% | 50,12% | 95,01% | 59,09% | 96,65% | 82,68% | 72,71% | 75,92% | 74,36% |
| ***<12*** | 0,00% | 12,80% | 49,88% | 4,99% | 40,91% | 1,43% | 4,08% | 0,00% | 0,00% | 0,00% |

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# Merceological analysis

- Total kernel/shell ratio: is more than 40% in all the tested varieties

| | BUTLER | C16 | C28 | DELTA | G186-M | GAMMA | GENEVA | HALL'S GIANT | JEFFERSON | SLATE |
|---|---|---|---|---|---|---|---|---|---|---|
| **In-shell average weight (g)** | 3,05 | 2,72 | 2,61 | 2,02 | 1,90 | 1,90 | 2,77 | 2,83 | 2,59 | 2,58 |
| **Kernel average weight (g)** | 1,43 | 1,30 | 1,14 | 1,04 | 0,96 | 1,00 | 1,23 | 1,39 | 1,24 | 1,20 |
| **Total ratio kernel/ shell** | 43,2% | 43,8% | 41,1% | 48,3% | 47,9% | **51,4%** | 41,0% | 46,3% | 44,2% | 41,4% |
| **Commercial ratio kernel/shell** | 32,7% | 41,0% | 36,5% | 44,5% | 44,4% | **48,3%** | 36,9% | 44,4% | 43,8% | 37,2% |

- Commercial kernel/shell ratio is low in Butler, C28, Geneva and Slate.

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# Merceological analysis

## Quality defects

**Rotten *(avariato)***

**Insect damaged *(Cimiciato)***

**Shrivelled**

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# Merceological analysis

- Most of the defects are mainly due to shrivelled nuts.

- Rotten and *cimiciato* defects are low.

- Rotten defects are primary due to the visible rotten and therefore it is not a major issue.

- Only Butler and Delta present high total rotten in comparison to the other, but still within the acceptable rotten limits.

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# Merceological analysis

| | BUTLER | C16 | C28 | DELTA | G186-M | GAMMA | GENEVA | HALL'S GIANT | JEFFERSON | SLATE |
|---|---|---|---|---|---|---|---|---|---|---|
| **Double** | 0,00% | 0,12% | 0,00% | 0,35% | 0,00% | 0,10% | 0,98% | 0,09% | 0,00% | 0,87% |
| **Visible rotten** | 1,07% | 0,09% | 0,09% | 1,49% | 0,54% | 0,17% | 0,68% | 0,42% | 0,00% | 0,56% |
| **Hidden rotten** | 0,80% | 0,00% | 0,10% | 0,80% | 0,00% | 0,00% | 0,10% | 0,30% | 0,50% | 0,30% |
| **Total rotten** | 1,87% | 0,09% | 0,19% | 2,29% | 0,54% | 0,17% | 0,78% | 0,72% | 0,50% | 0,86% |
| **Visible *cimiciato*** | 0,14% | 0,27% | 0,30% | 2,32% | 0,11% | 0,05% | 0,00% | 0,38% | 0,07% | 0,00% |
| **Hidden *cimiciato*** | 0,10% | 0,00% | 0,20% | 0,20% | 0,20% | 0,70% | 0,30% | 0,20% | 0,00% | 0,00% |
| **Total *cimiciato*** | 0,24% | 0,27% | 0,50% | 2,52% | 0,31% | 0,75% | 0,30% | 0,58% | 0,07% | 0,00% |
| ***Shrivelled*** | 9,29% | 2,46% | 4,23% | 0,00% | 2,86% | 2,93% | 3,44% | 1,12% | 0,33% | 3,60% |

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# Merceological analysis

- Blanching (pellicle removal):
  - Slate and Geneva present very low blanching (less than 10%),
  - Butler, C16 and Gamma medium blanching (less than 50%)
  - C28, DELTA, G186-M, Hall's Giant high blanching (more than 80%)

| | BUTLER | C16 | C28 | DELTA | G186-M | GAMMA | GENEVA | HALL'S GIANT | JEFFERSON | SLATE |
|---|---|---|---|---|---|---|---|---|---|---|
| **Blanching** | 39% | 45% | **88%** | **89%** | 77% | 49% | 12% | **100%** | 69% | 8% |

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# Chemical analysis

- All the chemical values are well within the acceptable limits in all the varieties.
- Sample acidity, expresses as a % of oleic acid, showed optimal values

| | BUTLER | C16 | C28 | DELTA | G186-M | GAMMA | GENEVA | HALL'S GIANT | JEFFERSON | SLATE |
|---|---|---|---|---|---|---|---|---|---|---|
| **Kernel humidity %** | 2,80 | 2,51 | 2,71 | 2,36 | 2,64 | 2,41 | 3,07 | 2,78 | 2,76 | 2,62 |
| **Cd µg/kg** | **11** | **10** | **11** | **<10** | **17** | **<10** | **<10** | **<10** | **<10** | **<10** |
| **Pb µg/kg** | **<50** | **<50** | **<50** | **<50** | **<50** | **<50** | **<50** | **<50** | **<50** | **<50** |
| **Total Aflaxatoxins µg/kg** | **0,08** | **0,08** | **0,08** | **0,08** | **0,08** | **0,08** | **0,17** | **0,08** | **0,6** | **0,09** |
| **Acidity %** | **0,09** | **0,06** | **0,13** | **0,08** | **0,07** | **0,07** | **0,06** | **0,08** | **0,1** | **0,07** |

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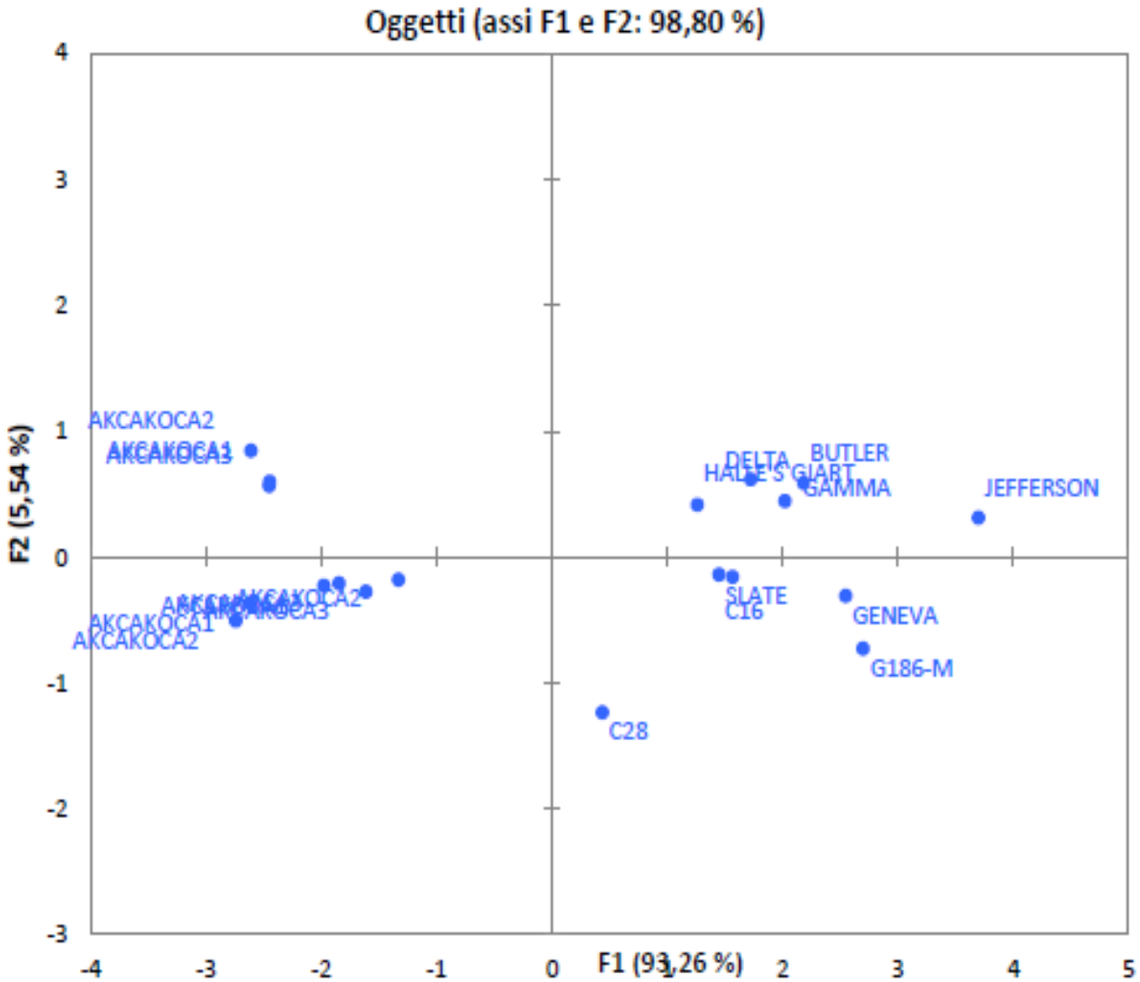
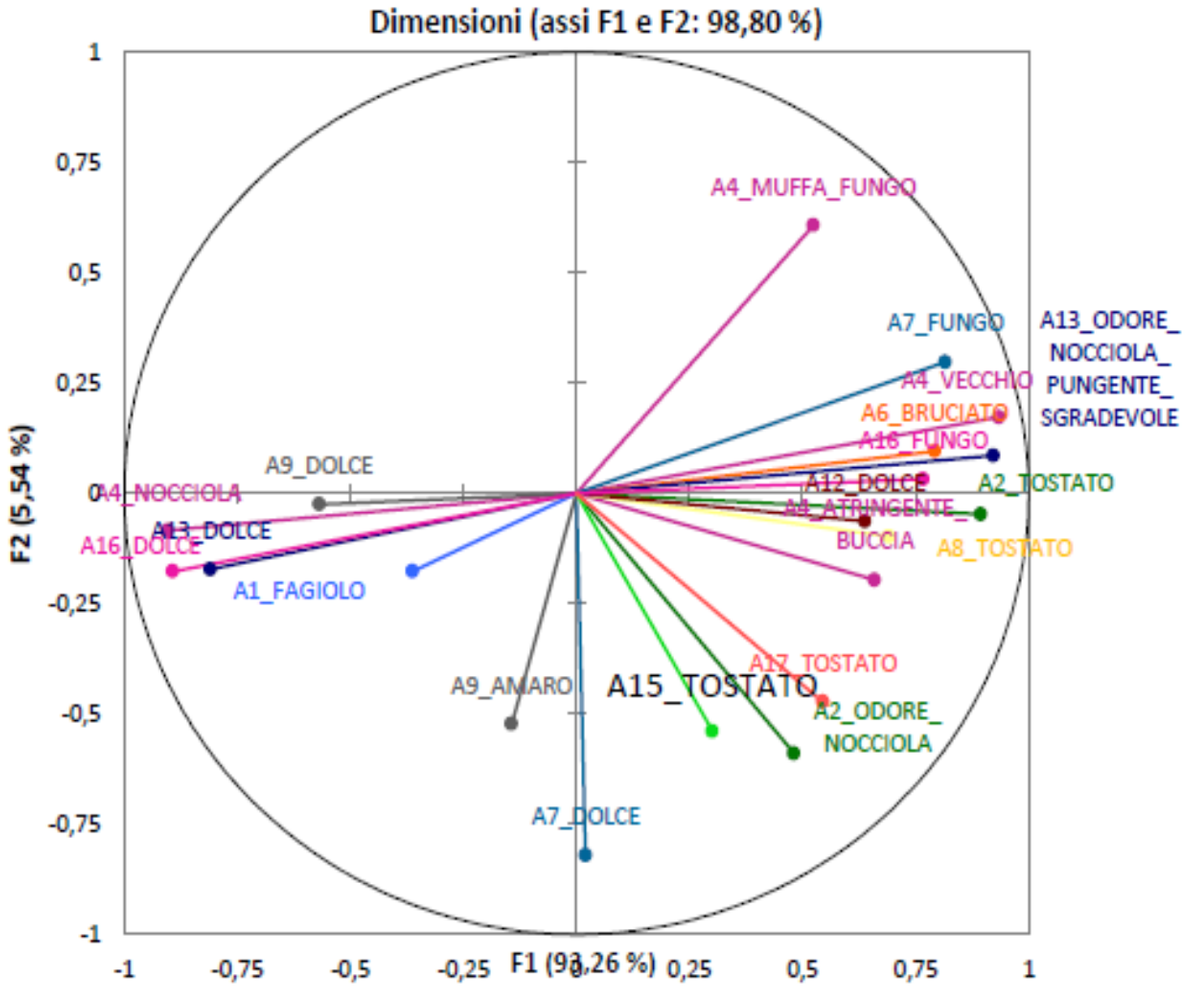
# Organoleptic analysis

- All tested varieties are quite different in taste compared to Akcakoca (used as an industrial reference), the blind testing showed a prevalence of burned, old, mouldy or astringent flavors.

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# Conclusions

- Only one season harvest (2015) is not enough to give us reliable information about the merceological and organoleptic industrial suitability of the Ontario varieties.

- To have a final consideration we would need to wait for the results of the 2016 samples which were again collected from Simcoe, Les High and Vineland. 15 varieties were sampled: Santiam, Hall's Giant, Epsilon, Tonda Di Giffoni, Gamma, Yamhill, Sacajawea, Barcelona, Jefferson, Slate, Geneva, G17, C16, Butler and G186-M

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# Conclusions

- From the merceological point of view, **Delta** and **Gamma** performed quite well, also **Hall's Giant** and **Jefferson** are acceptable.

- From the organoleptic point of view, the C28 performed better than the rest but not enough to meet the desired organoleptic requirements.

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