Research Article

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Changing the taste of apples by eurythmic treatments

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Abstract: Eurythmy is a performing art based on anthroposophy which tries to make non-visible forces visible by human movements. According to the concept of anthroposophy a eurythmist is capable to come into an exchange with the life forces of organisms through his movements. In a field experiment – executed by the Institute ArteNova in cooperation with an apple farmer – a eurythmist treated trees of two apple varieties with a sequence of eurythmic gestures to observe the impact on the fruit quality. The apples showed no differences in the laboratory test of sugar content and firmness. In the sensory test, significant differences could be found in several parameters like freshness, crunchiness or the total judgement. The results present a basic effect of human movements on the taste of plants. Furthermore, it was possible to find appropriate movements for pre-determined aims. Eurythmic movements could be seen as a possible method for agricultural systems which refuse pesticides and other synthetic substances. Follow-up experiments with different varieties, fruits, and places should verify the effects.

Keywords: Food quality; Biodynamic agriculture; Non-material influences; eurythmic

1 Introduction

The Institute ArteNova's subject is the research on the effects of eurythmic movements on growth and quality of plants. Since 2000, Tanja Baumgartner, a eurythmist at the Institute, has been studying these effects. The original goal was to show the potential of eurythmic movements in their effect on other organisms and substances. From 2010 on, more and more people came to the Institute ArteNova, founded in 2007, with the question about the practical application of eurythmic treatment of plants. In 2010, an apple farmer asked for a eurythmic treatment of apples in order to enhance the apple´s taste, especially the sweetness and crunchiness.

In a pre-project in 2011 the treatment of a small number of trees showed a significant difference in sugar content in comparison with the untreated control (Grundmann and Baumgartner 2012). In 2012, the test question was to confirm the results of two apple varieties in a sensory test.

2 Eurythmic treatment

At Institute ArteNova we presume that all organisms are surrounded and pervaded by life forces. They shape our body and keep the processes of life working in them. For us humans, they usually go on unconsciously. Only when feeling fresh or exhausted we perceive them indirectly. With eurythmy, we have a tool to visualize the life forces that are always in motion. From 1912 on, Rudolf Steiner developed eurythmy with the aim to bring the movements of the life forces into visibility: In eurythmy we do movements that, in their diversity, demonstrate the qualities of the living (Steiner 1984b).

With eurythmy we can also get into a lively dialogue with the organisms around us. In the movement, we can come into resonance with the life force of another person or plant. So we can learn to perceive the live forces outside of our body. Yet, we can also shape them with eurythmic gestures. The gestures are effective on their own. In curative eurythmy for example, we can treat patients with different diseases. This leads us to take responsibility for the further development of nature and humans (Steiner 1984a, Edelhäuser et al. 2015). Eurythmic gestures are movements of the body, especially the arms. Rudolf Steiner, the founder of eurythmy, gave a corresponding arm movement or gesture for each letter of the alphabet, which simulates the life forces of the speech process in its movement. For example, in the case of spoken A, it is easy to understand the gesture of

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the wide-open arms in correspondence with opening the mouth while speaking. A spoken U appears, on the other hand, when contracting and sharpening the lips and in the gesture by a stretched merging of the arms. In addition, Steiner also gave gestures for soul expressions; this includes the gesture of "Message". In this gesture, the stretched arms are opened forward like a funnel. The upper hand is the communicating, pointing and the lower hand the receiving, listening one. There are also eurythmic movements representing the planets and zodiac signs.

3 Materials and methods

3.1 Objects of treatment

The apple trees selected for the test consisted of two varieties of apples and were divided into two groups: eurythmically treated trees and untreated trees. Four combinations had been tested (Table 1).

Table 1: Combinations of apple variety and eurythmic treatment

variety	treatment
Ariwa	eurythmically treated
Ariwa	untreated
Rajka	eurythmically treated
Rajka	untreated

3.2 Selection of plants

The apple trees in the experiment stood on a bio-dynamic farm near Solothurn in Switzerland. The farmer initiated the choice of two varieties, Ariwa and Rajka, which are interesting for him due to their taste and their popularity by the consumers. All trees are spindle-bushes standing in rows at intervals of two meters. For each version of treatment (eurythmically treated and untreated) ten trees of each variety were selected by parameters of size and shape, number of flowers, and state of health. For the simplification of the treatment the ten trees were chosen in five pairs of neighboring trees. The distances between two pairs were between 10 and 15 meters. In one row, treated and untreated pairs alternated. The varieties Ariwa and Rajka stood in different rows. According to the already existing apple tree plantation the selected trees were not randomized.

3.3 Eurythmic treatment

Tanja Baumgartner selected the appropriate eurythmic gestures by searching similar qualities in the growth processes and in eurythmic movements. For example, the deep growth of the roots into the soil corresponds to the gesture D and the flow of the water in the tree from the roots to the leafs corresponds to the gesture L. The synthesis of sugar in the fruits is related to the quality and gesture of the sun.

The following sequence of gestures had been chosen:
Message-D-Sun-O-U-L-P

The apples had been treated seven times in intervals of about three weeks from the flowering period in April to the harvest in September 2012. Each treatment of a pair of trees lasted about five minutes. All treatments were done by Tanja Baumgartner (Figure 1).

3.4 Harvest

Eight apples per tree of a medium size and color had been selected by the farmer – who is experienced in field experiments – from the total harvest for the sensory test and

Figure 1: Tanja Baumgartner, treating an apple tree with the gesture U

three for the laboratory test to judge the sugar content and firmness.

3.5 Test methods

The analysis of the sugar content and firmness was done by FiBL (Frick, Switzerland). The sensory test took place at CSO (Centrum voor Smaakonderzoek, Wageningen, Netherlands) with a panel of 80 skilled testing persons. For each person one apple per combination (variety/treatment) was served, total 320 apples. The test was randomized and blinded. The testing parameters were flavor amount (total amount of all flavors), freshness, full flavor (impression of well-balanced flavors), sweetness, acidity, juiciness, mealiness, crunchiness, and overall judgement. The assessment was made in a scale from 0 to 100. The raw data were adjusted by CSO with a so called shrink-stretch procedure to normalize personal differences. The analysis of variance had been done with the Fisher´s LSD test (Statistica 10, StatSoft, Inc.).

Ethical approval: The conducted research is not related to either human or animal use.

4 Results

4.1 Laboratory test

The apples of both varieties and treatments showed no difference in the sugar content. The samples had a mean of 15.2 degrees Brix (Figure 2).

The apples of Ariwa showed a much higher firmness (mean: 7 kg/cm³) than those of Rajka (mean: 4 kg/cm³) (Figure 3). For both parameters, no difference between eurythmically treated and untreated samples could be found.

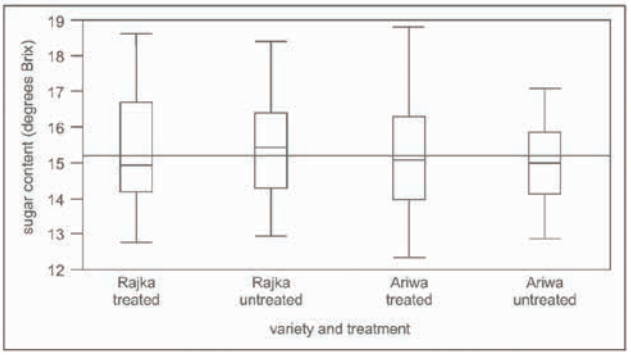

Figure 2: Sugar content of the apples per variety and treatment, mean and boxplots with median of $n_{apples} = 120$

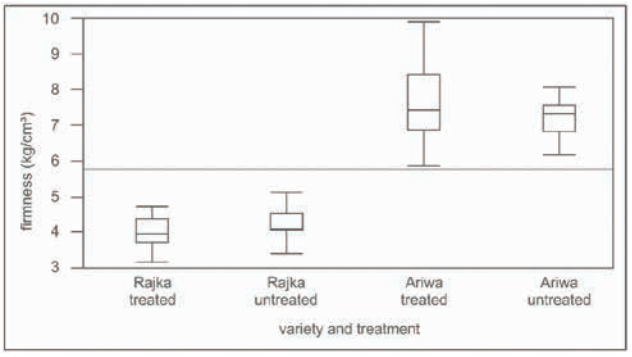

Figure 3: Firmness of the apples per variety and treatment, mean and boxplots with median of $n_{apples} = 120$

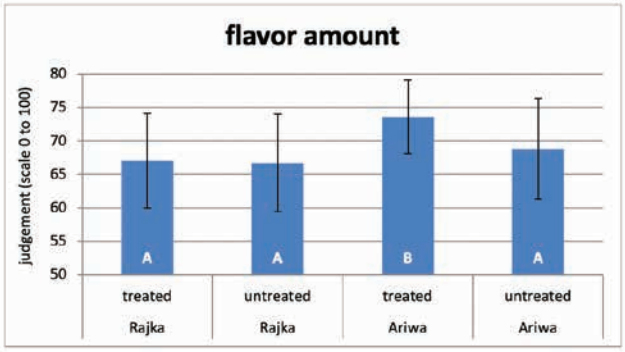

Figure 4: Flavor amount (mean ± SD, $n_{appels} = 320$, $n_{persons} = 80$, means without a same letter vary significantly, $p \leq 0.05$)

4.2 Sensory test

The flavor amount was significantly increased by the treatment at Ariwa ($p < 0.001$) but showed no difference at Rajka (Figure 4).

The freshness was significantly increased by the treatment at Ariwa ($p < 0.001$) but showed no difference at Rajka (Figure 5).

The full flavour was significantly increased by the treatment at Ariwa ($p < 0.001$) but showed no difference at Rajka (Figure 6).

The apples of Rajka were sweeter than those of Ariwa. The eurythmically treated version of Ariwa was sweeter by trend ($p = 0.052$). The sourness, juiciness, and mealiness of both varieties had not been changed by the treatment. The crunchiness had been increased by the treatment at Rajka ($p = 0.019$) but not at Ariwa (Figure 7).

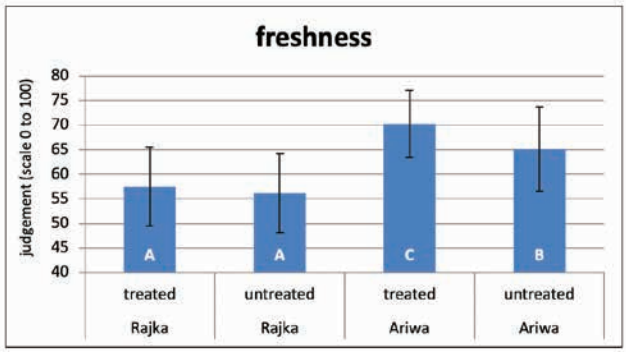

Figure 5: Freshness (mean ± SD, n_{appels} = 320, $n_{persons}$ = 80, means without a same letter vary significantly, p ≤ 0.05)

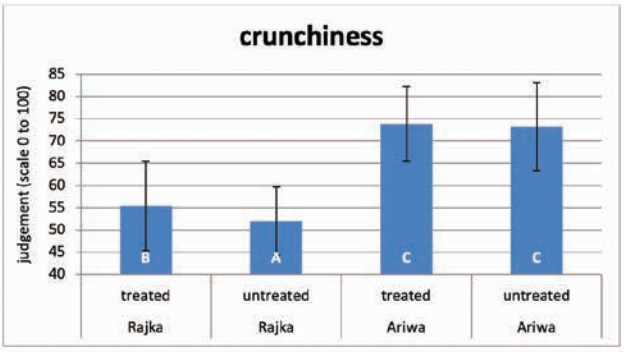

Figure 7: Crunchiness (mean ± SD, n_{appels} = 320, $n_{persons}$ = 80, means without a same letter vary significantly, p ≤ 0.05)

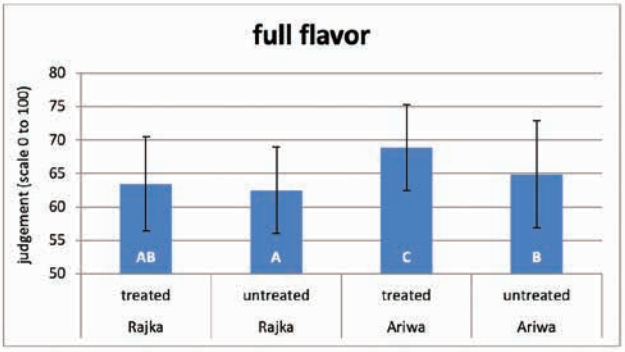

Figure 6: Full flavor (mean ± SD, n_{appels} = 320, $n_{persons}$ = 80, means without a same letter vary significantly, p ≤ 0.05)

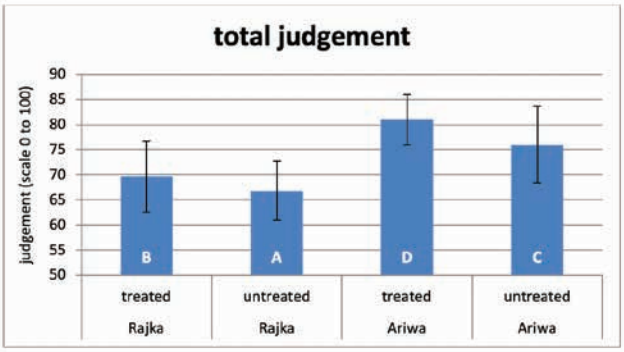

Figure 8: Total judgement (mean ± SD, n_{appels} = 320, $n_{persons}$ = 80, means without a same letter vary significantly, p ≤ 0.05)

The total judgement (Figure 8) had been high-significantly increased in both varieties Rajka (p = 0.006) and Ariwa (p < 0.001).

5 Discussion

In this present project could be shown the possibility of achieving quality changes in apples that have been targeted with eurythmic treatments of apple trees during the growing season. In the intensive study of the processes taking place in the apple tree, one can find qualities which are corresponding between eurythmic gestures and processes in the organism. This is shown by the conclusion that these gestures lead to expected changes in the present experiment.

In the present study, several parameters in the sensory test could be significantly influenced by eurythmic treatment. The difference in the overall assessment of both apple varieties by the eurythmic treatment became particularly clear. In some parameters the results of the Ariwa and Rajka varieties were different. We assume that apple varieties react differently to eurythmic treatments, as is generally known from other environmental factors. The change of several parameters with eurythmic treatment in apples confirms the results of Henatsch (2012). She observed changes in the growth of lettuce after eurythmic treatments.

The change in sensory parameters in the present study also confirms the results of the eurythmic treatment of garden cress (*Lepidium sativum*) by Grundmann and Baumgartner (2011). The application of gesture B there led to a significant change in the sensory properties.

Despite significant differences in the sensory tests, no differences were found in the laboratory analysis of taste-forming substances. This raises several questions: Are there any other substances to be tested? Is the taste of sweetness or crunchiness influenced by other sensory perceptions? The process of taste perception may be influenced by additional factors. These could be, for example, processes of varying intensity or speed in the development of taste in the mouth.

In the present study, treatment with eurythmy was performed by only one person. The cause of the changes could be both in eurythmy and in the person. In further studies the experiment should be done with more than

one person, but also in different places, with more varieties and different cultures.

The parameters sweetness and firmness do not say anything about a „better“ or „healthier“ quality of the apples. The better overall judgement for eurythmically treated apples may be an indication of higher apple quality. It should be noted, however, that the popularity of a taste depends strongly on the current culture and also on our habits.

For the further development and practical application of eurythmy treatment to plants, the question of practical implementation also arises. Results from Grundmann and Baumgartner (2018) show that water can possibly absorb the specific properties of eurythmic movements and pass them on to the plants. This should be tested in further experiments.

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Conflicts of interest: The authors declare no conflicts of interest.

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