Effect of Cinnamon (*Cinnamomum verum* Persl) Leaf Flush Color and Maturity Levels on Leaf Oil Content and Quality

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Introduction

Cinnamon (*Cinnamomum verum* Presl) is a spice obtained from the inner bark of the several trees from the genus *Cinnamomum* and family Lauraceae. *Cinnamomum verum* Presl is the commercial Cinnamon variety also known as "true cinnamon" or "Ceylon cinnamon" is native to Sri Lanka. Cinnamon and Sri Lanka synonyms in the world spice trade. The four types of essential oil obtained from the different parts of the cinnamon tree are, Cinnamon bark oil from the inner stem bark, Cinnamon leaf oil from the leaves, Cinnamon root oil from the root bark and Cinnamon seed oil from the seed pericarp. The unique feature where the oil distilled from these different parts of Cinnamon differ in their chemical composition, gives rise to much interest in connection with the biosynthesis of the various chemical constituents in the oil. The distillation of Cinnamon bark oil and leaf oil carried out in Sri Lanka. Cinnamon leaf oil is yellowish in colour and has a warm, spicy aroma. The viscosity is medium to watery. The main chemical components are Euginol, Safrol, Cinnamyl acetate and Cinnamldehyde. Over 50%-80% Euginol can be obtained from leaf oil. There are several factors which affect the Cinnamon leaf oil content and quality such as season, age of the tree, location, time of harvest etc. Purpose of this current study was to determine the effect of Cinnamon leaf flush color and maturity levels on leaf oil content and quality and to determine the different flush colors in Cinnamon population, different component of leaf oil related to leaf flush color and different component of leaf oil related to different maturity levels.

Methodology

For the experiment1, Effect of Cinnamon leaf flush color on leaf oil content and quality of 300 Cinnamon plants were observed and 5 different flush colors were identified. Five plants were selected as replicates in each flush color. Mature leaves of second and third branches from the main stems were picked and air dried about 5 days. After that they were cut into small pieces. The volatile oils were isolated by Clevenger arm method. Air dried leaf sample of 50g was placed in the distillation flask with 250 ml of distilled water and the distillation was continued for 4 hours. Extracted oil was separated from the water and was collected in small glass bottles and kept in the fridge until quality extraction. For quality determination of leaf oil 2 replicates from each flush color was taken. Extracted oil from each flush color and authentic samples (Euginol, Safrol, Cinnamaldehyde and Cinnamyl acetate) for cinnamon leaf oil was subjected to Gas Liquid Chromatographic analysis (GLC) to identified four important components named Euginol, Cinnamaldehyde, Safrol and Cinnamyl acetate. The second experiment, effect of cinnamon leaf maturity levels on leaf oil content and quality was carried out according to the same procedure described above. But the planting material was "SRI GAMUNU" variety established in the research station.

Results and Discussion

The data was collected by conducting 4 months research at Cinnamon Research Station. Established Cinnamon varieties with different flush colors were taken to this research. Five (5) different flush colors were identified and leaf oil content was calculated. Dark red, Red,

Brownish red, Brownish yellow red and light green were the 5 different flush colors. The colors were identified using Muncell color chart.

Effect of Cinnamon flush color on leaf oil content and quality

According to the data analysis (Figure 1), dark red flush color contain highest amount of leaf oil that is around 3g of leaf oil per 50g of leaf. Brownish yellow red and light green flush color contains equal amount of leaf oil that is 2.8g of leaf oil content per 50g of leaves. Lowest amount of leaf oil was extracted from Brownish red color flush. According to the statistical analysis, results shows that there was a significant difference of the leaf flush color on leaf oil content. The results showed that the intensity of the red color increased with the increase of the leaf oil content and it emphasized that there was an indirect relationship between red color pigments and the leaf oil content also.

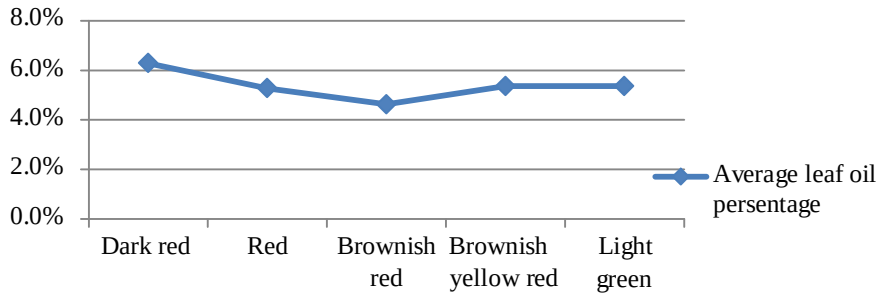

Figure 1. Flush color vs. average leaf oil percentage.

Oil samples of each flush color were subjected to Gas Liquid Chromatography and results showed that light green color contains highest amount of Euginol concentration. Light green color contains more chlorophyll content than the other flush color. Thus, there is some indirect relationship between chlorophyll content and the Euginol concentration. Even though dark red flush contains highest amount of leaf oil content the leaf oil quality was low in that color. According to the statistical analysis results, it showed that there was no significant difference between flush color and Euginol concentration.

Effect of Cinnamon maturity levels on leaf oil content and quality

In this experiment established "Sri gamunu" variety was taken as the planting material. Five types of maturity stages were identified as flush, immature, mature, over mature and ripen. Mature leaves contain highest leaf oil content it was marked as the 3g of leaf oil per 50g of leaf sample and when the maturity increased, the leaf oil content increases (Figure 2). When the plant turns to its senescence stage the leaf oil content decreased because the chlorophyll content decreases with the senescence stage (Krishnamoorthi et al., 1988). The results emphasized that there was a relationship between plant growth stages vs. leaf oil content. Statistical analysis revealed that there was a significant difference between leaf maturity levels and leaf oil content.

According to the analytical results mature leaves contained highest amount of Euginol concentration that was nearly 92%. With the increase of the maturity level, leaf oil content was increased and when the plant turns to its senescence stage the Euginol concentration was decreased. The chlorophyll content increases with maturity (Krishnamoorthi et al., 1988) and that showed there was a relationship between chlorophyll content and the Euginol concentration. Ripen leaves are not contain the component called Euginol and it contains Cinnamyl acetate (Shankaranarayana et al., 2007). Therefore, the results revealed that that there was an effect of maturity levels on the leaf oil quality.

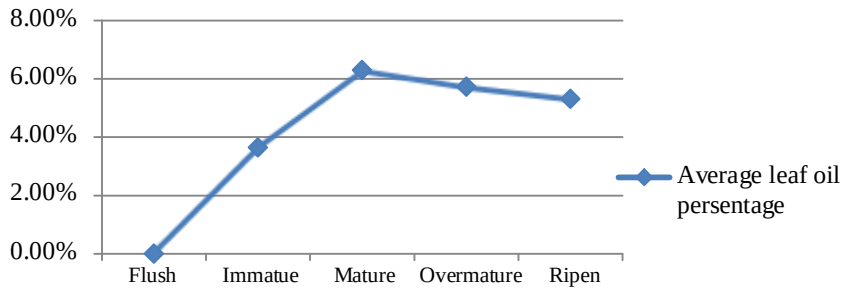

Figure 2. Maturity levels vs. Leaf oil percentage

Conclusion

There was a effect of Cinnamon leaf maturity levels on leaf oil content and quality, but flush color only affects to the leaf oil content not to the quality. Leaf flush did not contain oil and ripen leaves contains the chemical compound named Cinnamyl acetate. Dark red flush color contained highest amount of leaf oil but leaf oil quality was high in light green flush color. The mature leaves contained highest quantity of leaf oil.

References

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