METABOLIC FINGERPRINTING AND QUALITATIVE ATTRIBUTES OF TWO INDIGENOUS CYPRIOT CULTIVARS DESTINED FOR THE PRODUCTION OF 'COMMANDARIA': THE IMPACT OF LEAF REMOVAL AND DEHYDRATION PROCESS

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Abstract:

Context and purpose of the study - Grapes' sun-drying is one of the most critical steps in the production of 'Commandaria', a dessert wine with Protected Designation of Origin that is exclusively produced in Cyprus from grapes of the two indigenous *cultivars (Vitis vinifera* L.*),* namely 'Mavro' and 'Xynisteri'. Despite its significant economic importance, no data regarding the primary and secondary metabolites of the aforementioned cultivars exist.

Material and methods - Three interrelated experiments were performed. Initially, the effect of sun-drying on the composition of 'Mavro' and 'Xynisteri' musts was dissected. Musts were analyzed at harvest and at the end of the sun-drying. Thereafter, the effect of traditional sun-drying on the composition of 'Xynisteri' must was compared to four alternative dehydration methods [(a) multiple horizontal wires (MHW), (b) multiple vertical pallets (MVP), (c) low greenhouse (LGH) and (d) hot-air dryer treatment (HAD)]. Finally, the effect of leaf removal at veraison stage on the composition of must obtained from fresh and dehydrated grapes of both cultivars was evaluated.

Results - Significant differences in chemical composition of the musts before and after sun-drying were monitored under the first experiment. Except for the increase of soluble solids, a significant increment in titratable acidity, total phenols and total flavonoids was recorded due to condensation effect. Moreover, forty and forty two phenolic compounds were identified and quantified by LC-DAD-qTOF-MS in 'Xynisteri and 'Mavro' must, respectively. Results alsoindicated significant changes in the phenolic composition of the obtained musts. As regard the second experiment, LGH and HAD, led to a significant reduction of the dehydration period. Taking into consideration that HAD cannot exploited under the existing legal framework, LGH showed the greatest potential. Furthermore, LGH protects the grapes against several factors such as rodents, birds, insects and rain incidents. At the third experiment, leaf removal led to a reduction of soluble solids, titratable acidity, aroma potential and most of the phenolic groups of musts of both cultivars. Dehydration led to a significant increase of the aforementioned parameters in both cultivars, being more pronounced in cv. 'Mavro'. Overall, leaf removal indicated differential response in the dehydrated product based on the cultivar considered.

Keywords: 'Xynisteri', 'Mavro', sun-drying, Commandaria, LC-DAD-qTOF-MS

1. Introduction.

Fingerprinting and qualitative attributes of two indigenous Cypriot cultivars destined for the production of 'Commandaria': The impact of leaf removal and dehydration process

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Materials and methods

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Figure 1: Traditional sun-drying process

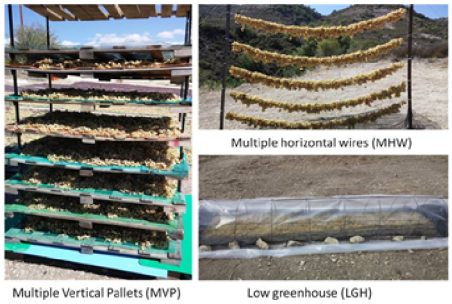

Figure 2: Alternative dehydration methods

Figure 3: 'Xynisteri' and 'Mavro' before and after leaf removal

Main findings / Conclusions

Significant differences in chemical composition of the musts before and after sun-drying were monitored under the first experiment. Except for the increase of soluble solids, a significant increment in titratable acidity, total phenols and total flavonoids was recorded due to condensation effect. Moreover, forty and forty two phenolic compounds were identified and quantified by LC-DAD-qTOF-MS in 'Xynisteri and 'Mavro' must, respectively (Fig. 4). Results also indicated significant changes in the phenolic composition of the obtained musts (Fig. 5). As regard the second experiment, LGH and HAD, led to a significant reduction of the dehydration period. Taking into consideration that HAD cannot exploited under the existing legal framework, LGH showed the greatest potential. Furthermore, LGH protects the grapes against several factors such as rodents, birds, insects and rain incidents (Fig. 6). At the third experiment, leaf removal led to a reduction of soluble solids, titratable acidity, aroma potential and most of the phenolic groups of musts of both cultivars. Dehydration led to a significant increase of the aforementioned parameters in both cultivars, being more pronounced in cv. 'Mavro'. Overall, leaf removal indicated differential response in the dehydrated product based on the cultivar considered (Fig. 7).

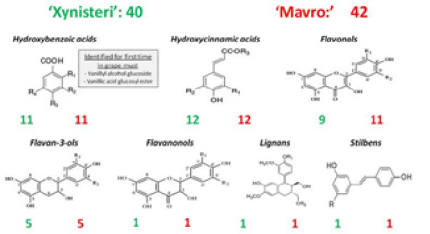

Figure 4: Identification of phenolic compounds (LC-DAD-qTOF-MS)

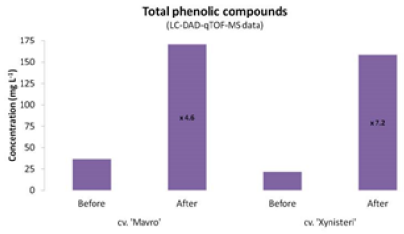

Figure 5: Sun-drying effect

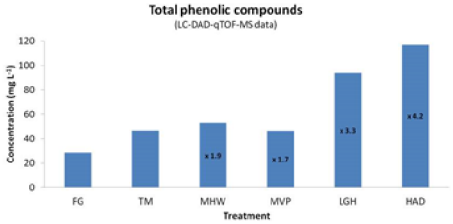

Figure 6: Dehydration methods effect

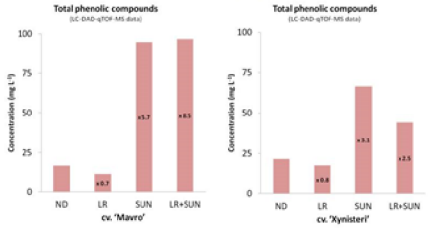

Figure 7: Leaf removal and sun-drying effect