Development of a genetic map of grape (*Vitis vinifera* L.) backcross offspring using high-throughput genotyping

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Introduction

The Crimean autochthonous grape varieties are a valuable source for breeding new cultivars with increased salt and frost resistance, as well as high quality berries.

However, they suffer from fungal pathogens, such as oidium and mildew.

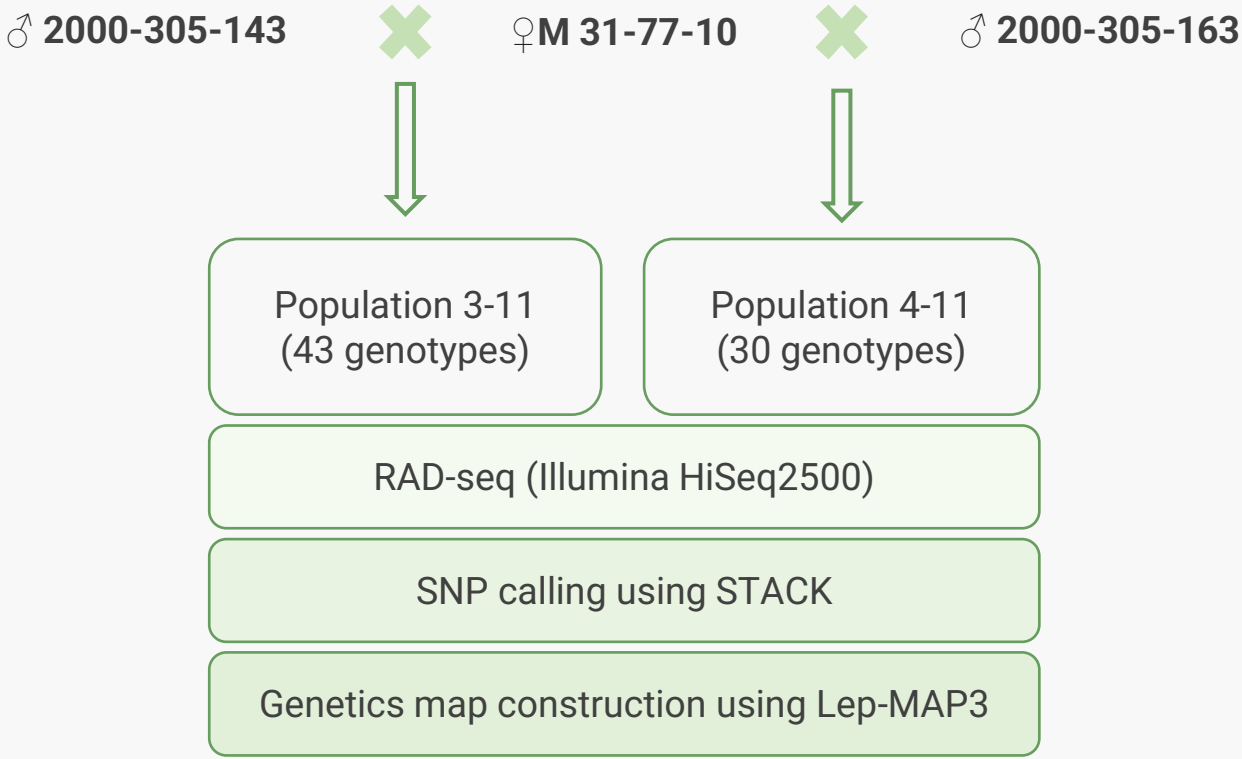
An increase in the resistance of Crimean grape varieties is currently achieved through interspecific hybridization.

In this study we report an attempt to construct linkage maps for two hybrid populations obtained using *Vitis* interspecific hybrid ‘Magarach 31-77-10’ as a female parent and donors of the resistance genes carrying introgressions from Muscadinia rotundifolia - the immune North American species.

V. rotundifolia, 2n=40
Muscadinia rotundifolia

V. vinifera, 2n=38

Experimental design



Aim & Tasks of the study

Aim:

Construction of linkage maps using the high-throughput SNP genotyping of two hybrid populations from the cross the elite breeding line ♀M.№31-77-10 and two male parents, carrying introgressions from *Muscadinia*:

Population 3-11 = ♀M.№31-77-10 x ♂2000-305-143.

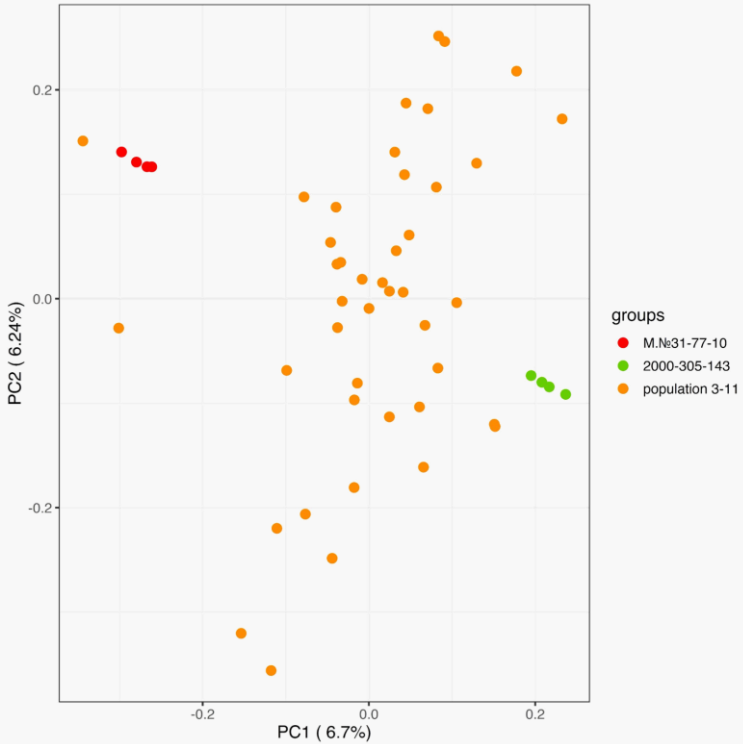
Population 4-11 = ♀M.№31-77-10 x ♂2000-305-163.

Tasks:

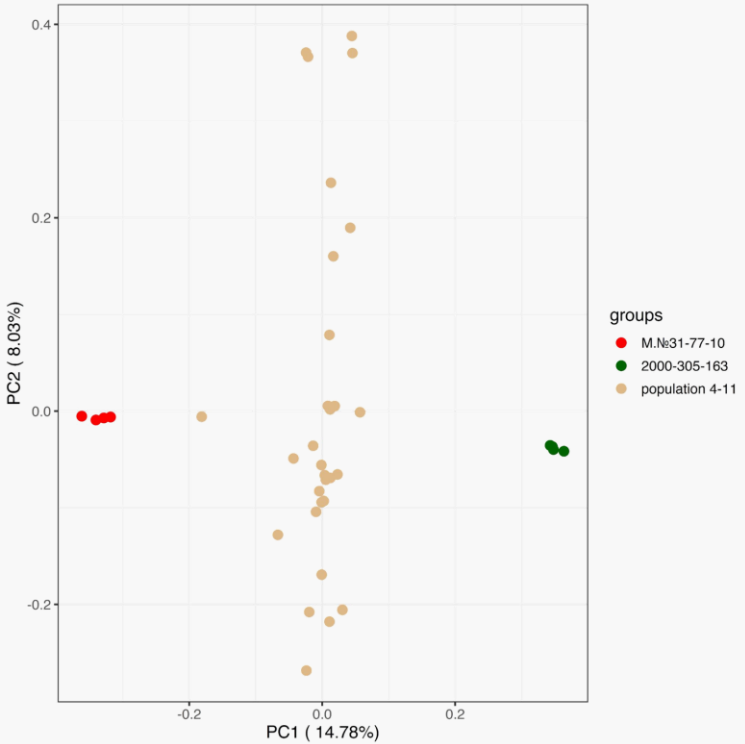
- DNA extraction
- GBS libraries construction
- SNP calling (STACK)
- Filtration (VCFtools)
- Chi-Square test
- Genetics map construction (Lep-MAP3)

Results of SNP calling

Pictures constructed by Grigoreva E.

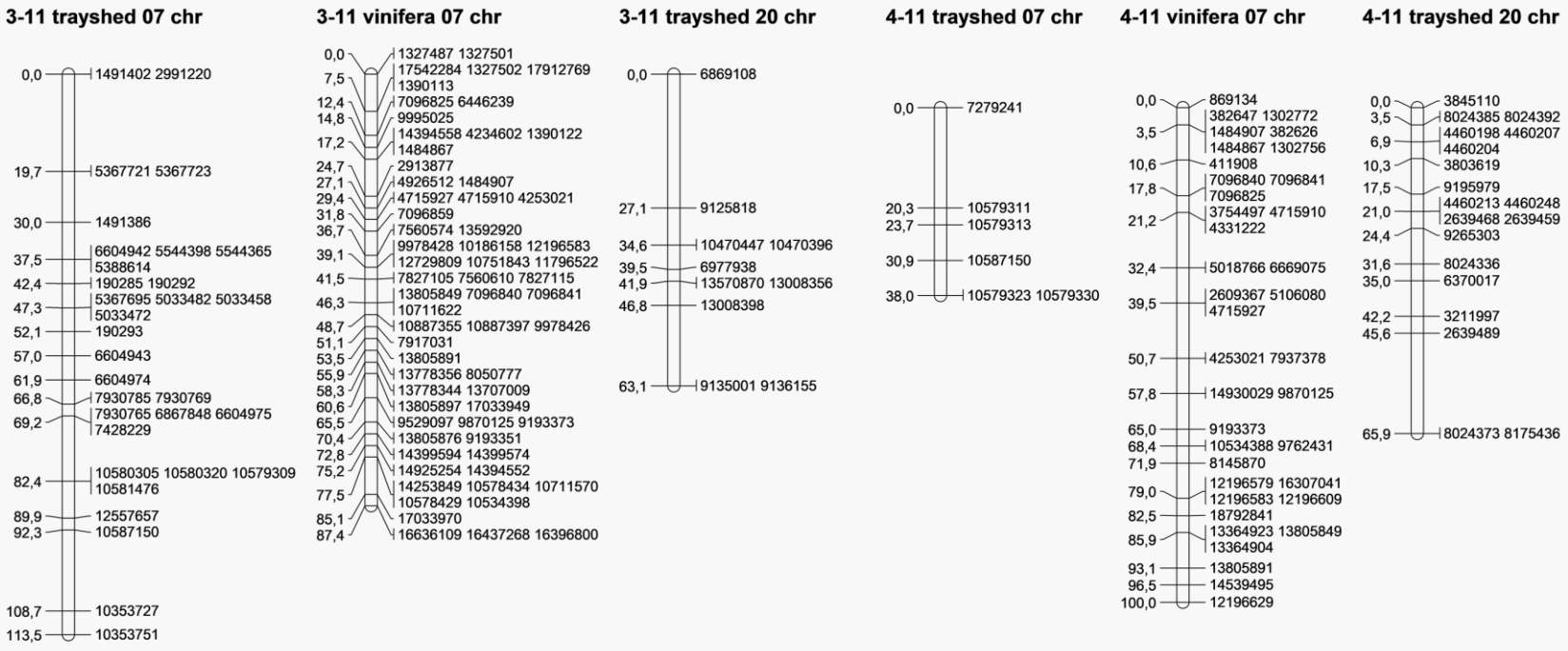


49275 filtered SNPS (MAF < 0.01 & missings < 0.5)

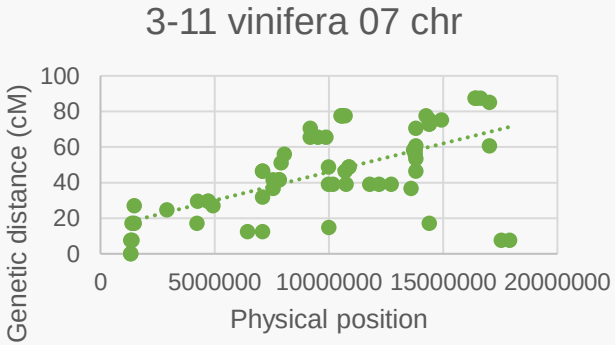


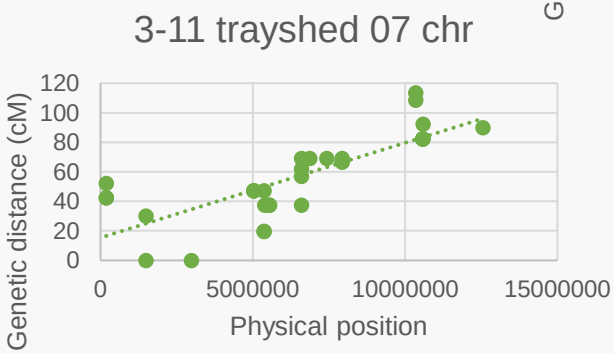
41601 filtered SNPS (MAF < 0.01 & missings < 0.5)

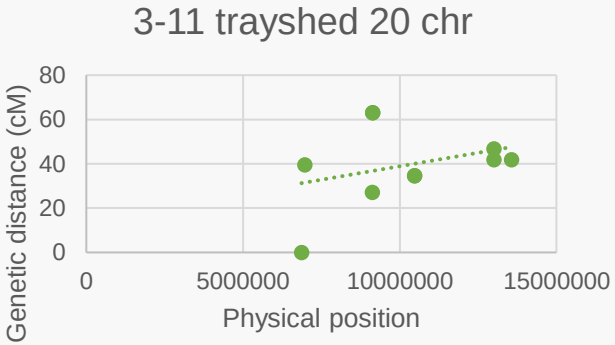
Results of genetic maps constriction



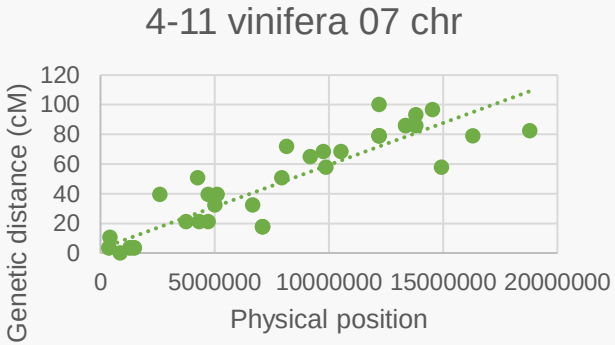
Results of genetic maps constriction (3-11)

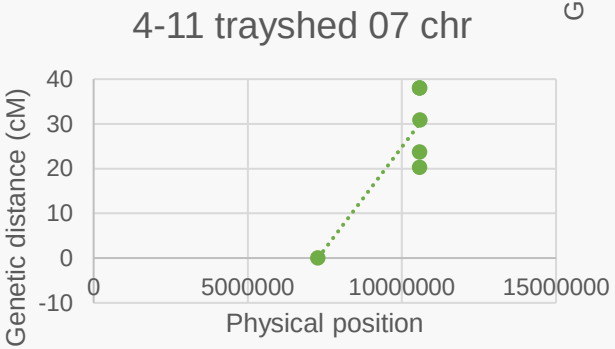


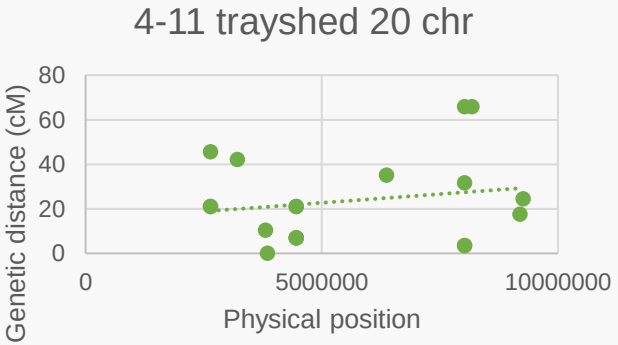




Results of genetic maps constriction (4-11)







Conclusions

Alignment was performed for the *Vinifera* and the *Muscadinia* (*Trayshed*), which is necessary to search for introgression by comparing the results obtained.

Six linkage maps were constructed for hybrid backcross populations for chromosomes 7 and 20 (for the *Trayshed*, since the 7th chromosome of the *Vinifera* consists of 7 and 20 *Muscadinia* chromosomes), where possible introgression from *Muscadinia rotundifolia* are located. Since the grape is a cross-pollinated species, for each cross a map was created relative to the female (F) parent.

Linkage maps can further serve as a potential source for a deeper study of genetic loci that affect the resistance to fungal pathogens of grape varieties adapted to the ecological conditions of Crimea.

Thank you for your attention!

Российский научный фонд

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