Apple orchard air microbiome study

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1. INTRODUCTION

The air microbiome contains any microbe that is in the air. The air contains mainly bacteria, but microscopic fungi and viruses can also be found in it. It's important to study them because several phenomena are affected by the live interaction between plants and the air microbiome. This live interaction affects the development and ripening of plants, fruits, as well as their resistance to diseases.

2. AIMS

The main reason for choosing this topic was personal experiences I received from my family, which has been engaged in agriculture for generations. During fruit growing, countless problems have had to be faced and still have to be faced, such as the prevention and treatment of various infectious diseases. That's where I got the idea to do my research, because we have little information about the role of the air microbiome in agriculture.

3. METHODS AND MATERIALS

In the 2.97-hectare orchard near Komoro (Eastern Hungary), the air-microbiome composition of six different apple varieties was examined. The samples were collected using a sample collection cloth. Then a suspension was first prepared from the samples in the laboratory (Fig. 1). This was followed by DNA extraction, using standardized, kit-based technology. During the DNA purification and extraction process, significant amounts of contaminants may remain in the sample. The purity of DNA was measured using the Nanodrop photometric device. The amount of DNA was determined using a Qubit fluorimeter. Based on the Illumina library creation protocol, a bacterial 16S rRNA gene-based metagenomics library was created, the V3 and V4 variable regions of the 16S ribosomal RNA gene were specifically reproduced. Finally, our results were analysed with bioinformatics methods.

Figure 1: sample processing

4. RESULTS

We analysed which apple varieties have a more diverse air microbiome. The lowest diversity was observed in the *Jonathan* variety, while the highest diversity was observed in the *Mutsu* variety (Fig. 2). Diversity is proportional to the viability of a community. In addition, the ratio of disease-preventive microorganisms was examined. The highest percentage was observed in the *Starking* breed, while lowest percentage was observed in the *Jonathan* breed (Fig 3).

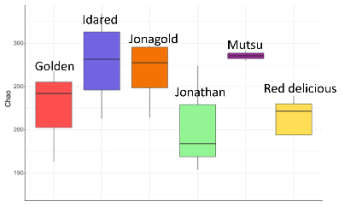

Figure 2: alpha diversity of air microbiome

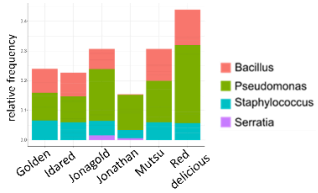

Figure 3: Ratio of disease-preventive bacteria

5. DISCUSSION

Based on our results, we would like to inform farmers about the importance of microorganisms later. Our results can help plantations. Varieties may have a beneficial effect on each other, the appropriate design of plantations can even reduce the amount of pesticides needed.

6. CONCLUSIONS

Our study has confirmed the association between alpha diversity of the microbiome and health. The variety with the least diversity had the lowest percentage of protective microorganisms, so it can be said that this variety is the least resistant to various infections.

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8. REFERENCES

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