

VIRTUAL MOBILITY (VM) GRANT REPORT TEMPLATE

This report shall be submitted by the VM grantee to VNS Manager, who will coordinate the approval on behalf of the Action MC, within 30 day from the VM activity end and in any case no later than the 20 October 2021.

Action number: CA19110

VM grant title: Round table: Cold plasma treatment of berries and future prospects of plasma technology as environmentally friendly technology

VM grant start and end date: 27/09/2021 to 10/10/2021

Grantee name: Pia STARIČ

Description of the outcomes and achieved outputs (including any specific Action objective and deliverables, or publications resulting from the Virtual Mobility).

The meeting supported by the VM grant took place on ZOOM video platform. The meeting started with four oral presentations, covering different topics:

- Problems with soft fruit – unwanted infections and solutions (Dr. Nika Cvelbar Weber)
- Plasma interaction with microorganisms: inactivation, recovery and stress response (Dr. Višnja Stulić)
- Treatment of berries in low pressure plasma (Assoc. prof. dr. Ita Junkar)
- Plasma systems (Dr. Matic Resnik)

The most interesting and welcomed contributions for the participants were presentations from assoc. prof. dr. Ita Junkar and dr. Nika Cvelbar Weber. Dr. Nika Cvelbar Weber presented the problems that the producers face during the production of berries as well as contributed great comments about using plasma activated water (PAW) in fruit production. This shed light on some aspects of plasma treatment of berries that were previously not addressed by the plasma research community. Such as washing of some berries (for example strawberries) actually has a negative effect because it can also washes the aroma (a trait that is highly wanted by the consumers).

Assoc. prof. dr. Ita Junkar presented interesting research on berry treatment with low pressure plasma, which is not commonly employed in the experimental setups of plasma treatment of berries and shows that low-pressure plasma also has a potential in plasma treatment of berries (not only atmospheric pressure plasmas).

During the discussion the participants agreed to several issues that need to be addressed in the research community and in the field of plasma research:

- Legal consideration of promoting plasma treatment as green and ecologically friendly technology
- Addressing the issues of identifying common protocols/standards in the experiments:
- Standard procedures to enable the comparison of different plasma sources,
- Standard procedures to determine the decontamination efficiency of plasma treatment of berries,
- Determine what are the quality properties of treated berries that need to be assessed.

In addition, it was proposed by the work group leaders that we provide an additional extended report of the meeting that will be used as a basis for the production of possible prospective paper and will contribute to the Technical Roadmap of the PIAgri COST action.

Description of the benefits to the COST Action Strategy (what and how).

The round table meeting on plasma and berries has also benefited to several points in the COST Action Strategy:

- It enabled us to create a multidisciplinary discussion and encourage the participants to enter the PIAgri COST action. One participant from the industry (PLAZMATEK) showed great interest in joining the PIAgri action which will additionally increase the potential of finding partners both in academia and industry.
- The meeting enabled the sharing of new knowledge, such as possible decontamination of berries infected with *Drosophila suzukii* with low-pressure plasma. Expert from the production of berries also advised that washing of the berries with plasma activated water (PAW) might not be applicable to most berries as washing causes the removal of the aroma. Thus this method of decontamination with plasma technology might not be useful. Additional concern with plasma treatment of berries was exposed, as the plasma can also cause the etching of the berry surface/coat that protects the fruit and its presence is also highly desirable by the consumers/buyers. Thus the researchers should strive towards the use of the plasma treatments with very low etching effects in case of berries.
- The meeting also enabled the support and involvement of early career investigator and female researcher to gain valuable experience in organizing and leading the meeting and roundtable discussion.

Description of the virtual collaboration (including constructive reflection on activities undertaken, identified successful practices and lessons learned).

The invitations were sent to COST action members, as well as through other forms such as social media (LinkedIn). Short contributions about the plasma treatment of berries from other laboratories were encouraged, however we did not receive any interest. Along with the registration through Google forms, the participants were asked a few questions that would help us with the organization of the event. We received a total of 47 registrations, from all over Europe (Italy, Spain, France, Germany, Portugal, Slovenia, Croatia, Serbia, Poland,...). 46.8% (22 answers) of the registered participants were not the members of PLAGRO COST action. 70.2% (33 answers) of the participants had no experience with plasma treatment of berries. Participants with experience in plasma treatment with berries mostly used blueberries as subject for the experiments. Most of the participants used dielectric barrier discharge (DBD) plasma or DBD jet. Only one participant stated the use of low pressure plasma for treatment of berries in their laboratory.

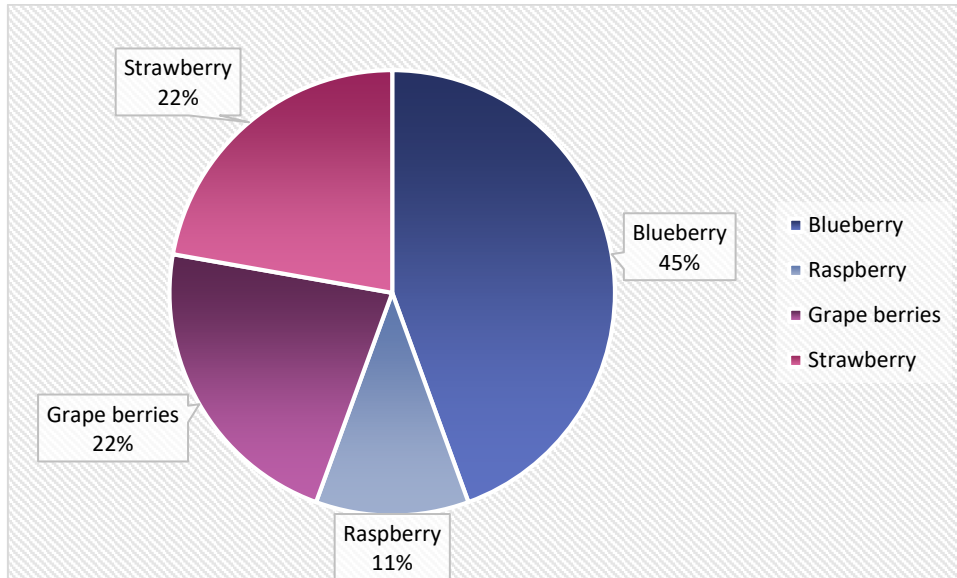


Figure 1: The most commonly used berries in plasma treatment

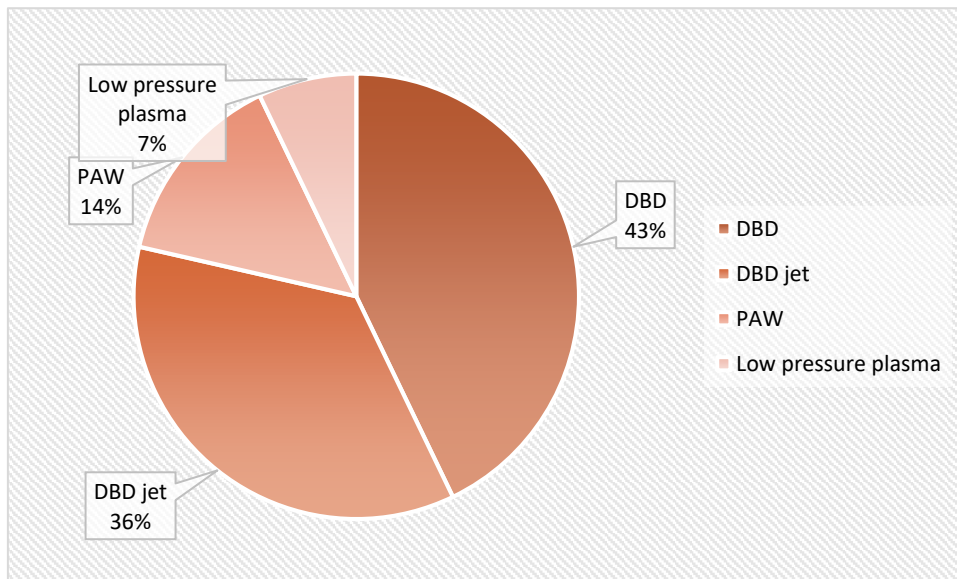


Figure 2: The most commonly used plasma devices

The virtual collaboration, the round table on plasma on berries, was successfully executed. The activity took place on the ZOOM video platform. The total number of participants in the meeting was 38 people.

The meeting started with four oral presentations covering four different topics:

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- Plasma interaction with microorganisms: inactivation, recovery and stress response (Dr. Višnja Stulić)
- Treatment of berries in low-pressure plasma (Assoc. prof. dr. Ita Junker)
- Plasma systems (Dr. Matic Resnik)

The most exciting and beneficial contributions with presentations were from assoc. Prof. dr. Ita Junker and dr. Nika Cvelbar Weber. Dr. Nika Cvelbar Weber presented the problems that the producers face during the production of berries and contributed great comments about using plasma-activated water (PAW) in fruit production.

After each topic, the participants had the opportunity to ask questions about the presentation. After the presentations, the meeting continued with the round table discussion, where the participants actively participated. However, experts from specific fields were absent. For future roundtables on similar topics, experts from the field of environmental and food safety legislation would provide significant input on the potential of plasma technology as an environmentally friendly technique.

In the future, it would be best if there was more time for the organization of the Virtual Mobility Collaboration. As there was little time, experts from the industry and the National laboratory for health, environment and food could not take the time to join our meeting, although they were interested in the event. This is unfortunate as they could provide many essential information and insights for the PIAgri community. With little time to prepare we were also unable to receive any of the possible contributions on their experience with plasma treatment of berries from the participants.