

The importance of the Pervermac II project in the sustainable use of pesticides and its impact on human health in the Macaronesian area. The

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Azores case.

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INTRODUCTION

The PERVERMAC II is a cooperation project on research and development in the field of agriculture and food safety with great impact on the health and food safety of consumers resulting from the surveillance of the presence of residues of pesticides, mycotoxins and heavy metals of the products produced and imported consumed within the geographical scope the archipelagos of the Macaronesian region (Azores, Madeira, Canaries and Cape Verde).

The main goals of all the fundamental and applied investigation work are:

- Sampling and analysis of residues of phytosanitary products, mycotoxins and heavy metals in vegetable products (fruits and vegetables) and cereals that represent the basis of the food pyramid in the Azores Archipelago;
- Promote the technical assistance and training of farmers in Terceira island(Azores) to support and enhance the local production, based on the minimum incidence of residues from the application of plant protection products;
- Risk assessment related to the intake of fruits, vegetables and cereals for the health of Azorean consumers and the development of educational actions with students of different grades at school level and for all consumers through the promotion of a healthy diet based on the consumption of fruits and vegetables with the lowest possible content of pesticide residues.

METHODS

The level of exposure of consumers to the application of pesticides will be determined by applying the recommended methods of sampling, defined by the Directive 2002/63/CE, from 11 July 2002, for the determination of pesticide residues in compliance with MRLS CAC/GL 33-1999. In the residues analysis methodology based on the EN 15662:2008 (E): Foods of plant origin — Determination of pesticide residues will be made by using GC-MS and/or LC-MS(/MS) following acetonitrile extraction/partitioning and clean up by dispersive SPE - QuEChERS-method; CEN 2008 was applied (Fig.1) (Fernandes, 2015). To analyze the pesticides effect on human health, it will be used a methodology for simultaneous identification and quantification of toxic pesticides in human blood. The application of the analytical scheme adopted uses a liquid–liquid extraction, followed by one single purification step, and quantitation of analytes by a combination of liquid and gas chromatography, both coupled to triple quadrupole mass spectrometry, which is operated in the mode of multiple reaction monitoring (Luzardo *et al.* (2015).

Regarding the food intake determination, a questionnaire followed by a food frequency survey quantifies the real proportion and frequency of food consumption in our diet (Fig. 2). Is planned to implement 200 questionnaires and food frequency surveys on individuals over 18 years of age, according to the percentage of the population of the two councils of Terceira Island (Angra do Heroísmo and Praia da Vitória). All the collected information will be statistically analyzed using SPSS statistical program.

Promotion actions tending to the dissemination of healthier and safer food diets will be developed at the level of the youngest, in schools, and on the population, in general. For that purpose, practical workshops demonstrating healthy eating habits and a manual regarding the adoption of good and healthier food practices (Fig.3).

Concerning the farmer and the technicians, planned demonstrations and actions will transfer knowledge and technology, and specific training. To ensure the adoption of integrated or organic production the elaboration of a manual concerning sustainable agricultural practices, promoting the use of compost and the sustainable use of pesticides an alternative ways will be followed.

RESULTS

The expected results from sampling fruits, vegetables, tubers, wine and cereals from our food diet will definitely contribute to the food security and the safeguarding of the population. This work will change some practices and pesticides applied that at farm level avoiding dangerous impacts on human health. Mainly involving the analyzed agricultural products from imported or local production. This will encourage using less pesticides or produce others agricultural products with higher nutrition value, promoting healthier food practices. The food surveys will give the real proportion of these products in our diet and will permit to correlate them with the levels of residues the blood. The actions to be promoted will influence the school population of different ages, by involving them on the preparation of balanced, complete and healthy meals and to the adoption of a new attitude towards a healthier diet (Fig.3). The Azorean population involved will know the impact on their health of the applied pesticides.

The elaboration of leaflets and of a manual of good food practices will give birth to a new way of looking to agricultural production process. This will permit to achieve a better selection, free of pesticides. At the same time, by choosing those with better nutrition qualities, we will permit to compare those produced locally with those imported, given empathize and preference to the local ones. The implementation of school agricultural parcels using IMP or organic production, will give a major contribution to change and to disseminate through the media, newspapers, radio and television the information obtained to the Island population involved.

CONCLUSIONS

Knowing the real impact of the normal applied pesticides to fight against pests and diseases of the crops will ensure a better food security. Monitoring the residues in agricultural products produced and imported is a very important way to ensure the food safety and the health of the Azorean population.

Campaigns and implementation of good and sustainable agricultural practices and eating habits, starting on the school students, consumers and inducing changes in farmers behavioral will be the most certain pathway to follow to have healthier foods habits in the Azorean population.

As for the farmer and the technician's, actions of transfer of knowledge and technology through demonstration activities and specific training will ensure the implementation of integrated production, promoting an sustainable agriculture and the use of alternative means to deal with the phytosanitary problems in Azorean crops.

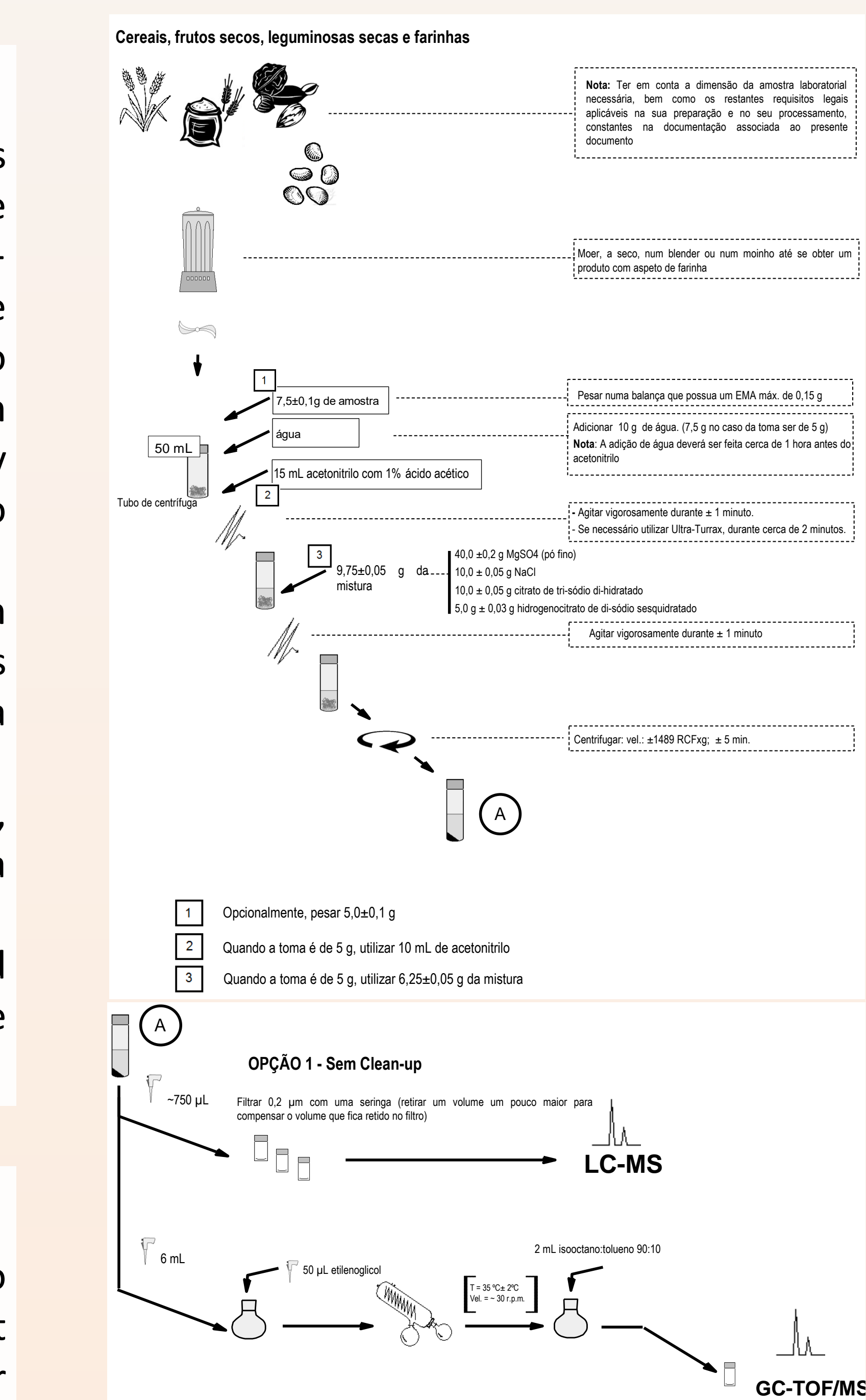


Figure 1: Methodology DAR- QuEChERS description – without clean-up (Fernandes, 2015)

Inquérito de frequência alimentar											
Nome: _____		Nº Inquérito: _____		Data: ____/____/____							
Grupo de alimentos	Nº vezes	frequência de consumo							Razões	Observações	
		D	S	Q	M	S	A	N			
1. Cereais											
1.1. Trigo (pão, torradas...)											
1.2. Milho (bolachas, pipocas...)											
1.3. Flocos de aveia											
2. Produtos Hortícolas											
2.1. Alface											
2.2. Brócolos											
2.3. Cebola											
2.4. Cenoura											
2.5. Courgette											
2.6. Couve Portuguesa											
2.7. Hábica											
2.8. Repolho											
2.8. Tomate											
3. Tubérculos											
3.1. Batata											
3.2. Batata Doce											
4. Frutas											
4.1. Banana											
4.2. Maçã											
4.3. Morangos											
4.4. Pêra											
5. Vinho											
D (diário), S (semanal), Q (quinzenal), M (mensal), S (semestral), A (anual), N (nunca)											
Razões: não consumi ou consumi pouco (frequência: mensal, semestral, anual ou nunca)											
1. Não gosta 2. Preço 3. Difícil preparar 4. Não tem o hábito 5. Outras (especificar)											

Figure 2: Food frequency survey.



Figure 3: Practical workshops developed in school's with student's

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