



## **A Farmer's Toolbox for Integrated Pest Management Practices**

AGRI/2020/OP/0003

**Case study – Fruchtkalk, Bulgaria**

## Abstract

The case study is aimed at shedding light on the effectiveness and success of an integrated pest management (IPM) measure Fruchtkalk that proved to be successful in the field of IPM. The case study will attempt to explore the best practices and also to investigate relevant problems of the implementation of Fruchtkalk as IPM measure on national level in Bulgaria.

The product Fruchtkalk was introduced in Bulgaria through a partnership between Balkan Bio Frucht Ltd. and the German firm Schneider Verblasetechnik . The product has been used widely as fertilizer and plant protection product due its status as basic substance by conventional and bio producers of berry, vine and horticulture crops in Bulgaria.

The case study identifies and considers challenges around the application of Fruchtkalk and the perceivable difference between the views of producers and National authorities on the use of Fruchtkalk.

## 1. Introduction

The commercial product Fruchtkalk is a natural product suitable for use in conventional and organic fruit and vegetable production in Bulgaria. The product can be applied as a foliar and soil fertilizer and also as a means of maintaining levels below the established thresholds of economic harmfulness of a number of fungal and bacterial diseases including Fire blight, Esca, and some species of harmful insects including *Drosophila suzukii*.

The active substance in the commercial product "fiMUM Fruchtkalk" is Calcium Hydroxide CaOH. The product Fruchtkalk complies with the set criteria for 'basic substance' and has been tested and registered in Germany. Currently in Bulgaria, the product Fruchtkalk fulfils the criteria for an 'basic substance' under Regulation (EC) 2015/762 and is approved as foliar and soil fertilized. The status of "basic substance"<sup>1</sup> provides farmers and producers with the right to use the product as fertiliser, but also as plant protection product. Moreover, the product is certified with quality corresponding to the quality for food industry. The product is used in conventional and bio production as fertilizer and plant protection product and is approved for use in horticulture, field crops, berry crops, vineyards and orchards in Bulgaria.

According to representatives from Balkan Bio Frukt Ltd, Fruchtkalk is a broad spectrum product and like most organic product, it is used for a variety of pests and diseases, which makes it very attractive for organic/bio farming. This was among the reasons, why the product quickly became popular among the Bulgarian Raspberry Association.

The active substance Calcium hydroxide is the oldest product used in agriculture to protect against diseases without causing resistance in pests and without harm to the environment. Calcium hydroxide, alone as a lime milk and in combination, is the basis of two important products for organic farming: Bordoleate solution and Sulfur solution. Trials from organic production have shown that by using this technology it is possible to reduce the amount of metallic copper within acceptable limits.

The Fruchtkalk production technology is targeted for application with all types of existing ground equipment and sprayers due to one innovative feature of the product - smaller sized particles. The product has double milled and micronized with a particle size below 20 microns makes it suitable for use with all types of sprayers and nozzles. Another distinguishing feature of Fruchtkalk is the specially developed by the company adhesive which provides a long-lasting protective effect for up to 14 days, even with rainfall up to 3 mm falling 30 minutes after treatment with the preparation. Most of all, there is no quarantine period after use of the product. The Fruchtkalk product falls under principle 4 of the IPM frame: Sustainable non-chemical methods. This principle refers to the use of non-chemical methods and product such as bio-pesticides, macro-organisms, mechanical, physical and bio-technical methods instead of chemical ones, where suitable and sufficient. Many of the non-chemical methods are less effective and/or more expensive than pesticides. However, in the case of Fruchtkalk, studies have shown success and effectiveness of the product, when used to fight fruit and grape pests.

During the course of the desk research and conducting interviews with relevant stakeholders, problems related to the implementation/application of Fruchtkalk as a measure for prevention and control of pesticides in berry crops, vines and fruit species in Bulgaria

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<sup>1</sup> <https://eur-lex.europa.eu/legal-content/BG/ALL/?uri=CELEX:32015R0762>.

were identified. The problems identified during the course of the research will be discussed later in the case study.

The case study will also introduce and describe the NEFERTITI project, due to its strong relevance to the topic of pesticide use reduction. Since 2018, the NEFERTITI project has been supporting the implementation and use of Fruchtkalk in Bulgaria due to its proven effectiveness against fruit and grape pests such as *Drosophila suzukii*.

### Context and background information

Currently, Fruchtkalk is registered and approved for use in Bulgaria as a fertilizer containing 74% CaO calcium oxide. The Fruitkalk technology is widely used in the country in horticulture, field crops, berry crops, vineyards and orchards in the country both as fertilizer and also as plant protection product

In the context of Bulgaria, the technology has qualities that distinguish it from the existing products on the market with calcium content. Some of them are the following:

- The preparation has a quality certificate corresponding to the quality for food industry;
- Double milled and micronized with a particle size of less than 20 microns makes the German fruit lime suitable for use with all types of sprayers and nozzles;
- Quickly and easily assimilated by plants and their great soil penetrating ability;
- Thanks to the specially developed adhesive technology, a long-lasting protective effect of up to 14 days is ensured, even with rainfall of up to 3mm falling 30 minutes after treatment with the product;
- There is no quarantine period after the use of the preparation.

### NEFERTITI Project

The Networking European Farms to Enhance Cross Fertilisation and Innovation Uptake Through demonstration (NEFERTITI) is a €7m project funded by the Horizon 2020 programme, comprising 45 regional hubs in 17 countries. The project is aimed at exchange of knowledge and technical content between 10 thematic networks in order to boost innovation uptake and to improve peer-to-peer learning and connectivity among farming actors across Europe.

The National Agricultural Advisory Service (NAAS) is coordinating the Bulgarian hub under Thematic network 9 "Pesticide use reduction in the production of grapes, fruits and vegetables" of the NEFERTITI project. The focus is on methods for pest monitoring; application of nutrients and products of botanical and microbial origin for pest control; resistant varieties of organisms pathogenic to crop plants; innovative approaches to the application of plant protection products.

In this line, the NEFERTITI project collaborated with Balkan Bio Frucht, on a [few initiatives](#)<sup>2</sup> to demonstrate the commercial product Fruchtkalk and to disseminate information on the product and its use on berries (raspberries) and other horticultural species for disease and pest prevention and protection against temperature stress. The profile of participants

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<sup>2</sup> Invitation for Demonstration on Innovative Technology for Disease and Pest Prevention and Protection Against Temperature Stress in the Cultivation of Berries (Raspberries) and Other Horticulture Species Using German Lime – Fruchtkalk.

interested in the activities related to the NEFERTITI project is different. Those interested are from different fields related to agriculture. The farmers are specialised in greenhouse production, growing fruit and vegetables in open fields and managing areas under permanent crops. In addition, they have also received interest from various structures of the National Center for Agrarian Science (NCAS), the Agricultural University, private companies and industry organisations.

## 2. Research theme

The aim of the case study is to shed light on the effectiveness and success of an integrated pest management (IPM) measure (Fruchtkalk) that proved to be successful in the field of IPM. The case study will attempt to explore the best practices and also to investigate relevant problems of the implementation of Fruchtkalk as IPM measure on national level in Bulgaria.

The main research questions explored via this case study are the following ones:

- Was Fruchtkalk identified as an effective substance for pest reduction in Bulgaria? Who has the capacity to identify successful practices, techniques and technologies?
- How was Fruchtkalk introduced and implemented in Bulgaria?
- To what extent the measure was applied/ implemented at different levels (local, regional, national producers)?
- What were the effects of Fruchtkalk in Bulgaria?
- Are there the difficulties in the use of Fruchtkalk in Bulgaria? Which factors influence farmers in their choice of other types of technology? and
- What was the reason for the non-acceptance of Fruchtkalk into to the National Support Programme "Control of Pests in the Winter Period"?

## 3. Methodology

Few methods of information gathering and analysis were used and combined to compile the case study.

### Selecting relevant stakeholders

The selection of relevant stakeholders to be contacted for interviews was based on desk research and examining available online sources. First, the main actors directly involved in the introduction and implementation of the IPM measure were identified. These included the private company, Balkan Bio Frucht Ltd., and the Association of Raspberry and Berry Producers, which both actively promote the use of Fruchtkalk among farmers and producers in Bulgaria.

Second, the relevant national competent authorities (NCAs) involved in the regulation of IPM measures in Bulgaria were identified, based on the initially identified list of NCAs for the wider pilot project. These included the Bulgarian Food Safety Agency and the National Agricultural Advisory Service. The latter is especially relevant for the case study, as it is the organisation coordinating the Bulgarian hubs within the NEFERTITI project.

Finally, additional stakeholders, which might be relevant to the dissemination and communication of the initiative were identified. These included various farmer associations such as the National Viticulture and Wine Chamber, the Union of Danube Fruit Producers, and the Bulgarian Association of Manufacturers of Greenhouse Products.

### Desk research

Initial information on the topic was gathered through desk research. A list of key terms and words was put together. This aided the process of finding relevant sources of information and also key actors pertinent to the case study topic.

### Interviews

In addition to the desk research, interviews were held with all relevant actors to the case study - representatives of the Bulgarian Association of Raspberry and Berry Producers, the National Agricultural Advisory Service (representing the NEFERTITI project), Balkan Bio Frukt Ltd, and the Bulgarian Food Safety Agency. Additionally, the team contacted the National Viticulture and Wine Chamber (NVWC), the Union of Danube Fruit Producers and the Bulgarian Association of Manufacturers of Greenhouse Products. However, they did not express interest in participating in the case study.

No on-site interviews were conducted given the complicated epidemiological situation related to the COVID-19 pandemic. All interviews were conducted via Microsoft Teams or by phone.

The main possible limitations to conducting the field work were as follows:

### Possible limitations caused by the Parliamentary Election in July 2021

The period of carrying out the case study coincided with the Parliamentary Election in Bulgaria. During such periods, national and regional authorities are usually unavailable and/or busy, and they often refuse to take part in such activities and initiatives. Coupled with the summer period, it is even more complicated to get a hold of relevant key actors, as most people go on leave during the summer in Bulgaria and are not available. The team decided to contact key stakeholder again later in the summer period to arrange their participation in the case study.

### Possible limitations caused by the lack of interest in some of the invited interviewees

For some of the invited key actors, we found it difficult to raise their interest in the topic of integrated pest management and more specifically its relation to the specific case study. This risk was identified in advance and according measures were taken to ensure that key actors and stakeholders participated in the case study. Moreover, the team prepared a list of additional candidates who were suitable as participants in the interviews. Some of them were contacted during the second stage of interview process in order to reach the requested number of interviews for the case study.

### Possible limitations caused by the lack of data, up-to-date or sufficiently detailed data:

During the desk research phase, a gap in available data was identified. Statistical data on the implementation of IPM in Bulgaria is not currently collected or information is no longer uploaded online and in databases. Therefore, the availability of information online was limited. The team incorporated additional questions in the interviews in order to obtain more information on the implementation of IPM and the product Fruchtkalk in Bulgaria.

## 4. Activities and results

### 4.1 Objectives

The product Fruchtkalk was introduced to Balkan Bio Frucht Ltd. by a Swiss partner who has invited to a seminar and lecture in Bulgaria, as lecture in 2018. During this time he introduced Fruchtkalk as a product which was registered and used to combat the dangerous pest *Drosophila suzuki* in Switzerland. The year after the introduction, Balkan Bio FruchtLtd invited the representative from the German firm Schneider Verblasetechnik to deliver a joined presentation to the members of Bulgarian Raspberry Association.

Furthermore, Balkan Bio Frucht Ltd. made a connection with the Swiss Association Bio Selena based in Bulgaria. They delivered a joined presentation to disseminate information about Fruchtkalk. Since 2019 few initiatives such as seminars and presentations have been delivered in Bulgaria by Balkan Bio Frucht Lts and their various partners in Bulgaria to promote the use of the product in bio production of crops such berries, horticulture and different sorts of red fruits, including vines.

In the last 2-3 years, the Fruit Lime - Fruchtkalk has been used by fruit and berry growers during two main periods as a fertiliser and in some cases as a plant protection product. The product is also used widely in bio production in Bulgaria for different crops such as berries, vines and others.

In winter, the product is used for complete liming of fruit trees, for complete disinfection of the plantation, liming of the entire crown and fruit buds, for protection against all types of overwintering forms of pests, and also to protect the trees from frost wounds, late spring frosts, frosts and as well as for the control of the important economic disease Nitrial Canker on trees and Esca disease on vines.

In the country, Fruchtkalk is used preferentially in organic and conventional plantations because, according to the interviewees there is no preparation or support, in terms of pest control and protection from climatic factors for organic producers for the winter period in Bulgaria. This technology, according to farmers and associations, is an element of good agricultural practice and also an element of integrated pest management.

During the growing season, Fruchtkalk lime is used in horticulture, berry growing, viticulture and vegetable production in Bulgaria. For example, in fruit growing of cherries when cherries crack, in order to combat the dangerous pest *Drosophila suzuki* in cherries, berries, wine and table grapes, farmers use Fruchtkalk. Farmers and producers also use the product for plant protection after exposure to heavy rains and hail, against a number of diseases and pests in fruit crops and vegetables that need a lot calcium for their sustainable development and as protection against peak rot on tomatoes and red peppers, cabbage, potatoes and others.

### 4.2 Governance and functioning of the initiative

The actors relevant to the initiative are the following: National Agricultural Advisory Service (NAAS); Balkan Bio Frucht Ltd.; Bulgarian Food Safety Agency and The Association of Raspberry and Berry Producers.

Balkan Bio Frucht and NAAS are the two main actors responsible for all activities around the introduction and implementation of Fruchtkalk in Bulgaria.



NAAS supports the initiative through the NEFERTITI project for knowledge transfer and dissemination under (Network 09) "Reducing Pesticides Use in the Production of Grapes, Fruits and Vegetables". The focus of the initiative is on pest monitoring methods; application of nutrients and products of botanical and microbial origin for pest control; resistant varieties of organisms pathogenic to crop plants; innovative approaches for the application of plant protection products.

Balkan Bio Fruct Ltd. is a private company actively introducing and organising different events such as introducing Fruchtkalk to new farmers, live demonstrations on how to use and apply the product, disseminating information about the product in the last couple of years. During 2019 Balkan Bio Fruct and the NEFERTITI project partnered to organise an event, including demonstration of Fruchtkalk with the aim of disseminating of knowledge on the Fruchtkalk technology for disease and pest prevention and temperature stress protection in the cultivation of berries (raspberries) and other fruit species using German fruit lime. This specific initiative was organised and funded under the NEFERTITI project.

The Association of Raspberry and Berry Producers are amongst, if not the largest group of farmers and producers who actively use and apply the technology of Fruchtkalk in the crop production.

The Bulgarian Food Safety Agency, along with the Ministry of Agriculture, Food and Forestry are the national central authorities who are responsible for the administrative and legislative/policy aspect around pest management. They are actively engaged with new regulations, such as Regulation №9 which is focused mainly on the implementation of integrated pest management. In terms of Fruchtkalk, both BFSA and the Ministry of Agriculture, Food and Forestry are the National bodies which have the authority to investigate, accept or decline products such as Fruchtkalk in National Plans, such as the . According, to the representative from Balkan Bio Fruct, both National bodies were reluctant in terms of accepting Fruchtkalk in the in the National Support Programme "Control of pests in the winter period" and for disseminating of information about the product and its use due to insufficient awareness of the product.

### 4.3 Results (and successes)

#### Successful practices and technologies being used by the initiative

According to the Bulgarian Raspberry and Berry Producers, Fruchtkalk could be applied to a large number of crops, beyond its application for berry crops in different combinations such as Calcium, Calcium-Sulfur, Calcium-Magnesium, Calcium-Iron, which can in return achieve results depending on the needs of farmers to solve a number of problems related to pest management.

Research has shown that -Fruchtkalk Lime can work in conjunction with Copper preparations to be used in reduced quantities which is the basis of a European directive to reduce the use of copper in organic production.

#### Results in terms of reducing the dependency of pesticide use

The results in terms of reducing the dependency of pesticide use in Bulgaria related to Fruchtkalk are difficult to determine due to the lack of quantitative data on the use of the product. At this stage, it could be assumed that a small fraction of Bulgarian producers and farmers are applying the initiative actively. Among those who use Fruchtkalk are the producers of fruit and berry crops during both active seasons.



### Extent to which the objectives of the activities have been met

The objective of the activities which were planned at the beginning of the studies were met to great extent. The team was able to contact key actors that are directly related to the topic of the case study and carry out deep interviews to obtain the necessary information. As mentioned before, there were some possible limitations to conducting the study, but they were overcome successfully.

Extent to which the results and achievements of the initiatives have been communicated/ disseminated outside the initiative.

During 2017, the Fruchtkalk product was presented at the annual international conference on organic farming during the AGRA international exhibition in Plovdiv in cooperation with the Swiss Bio Selena Foundation. It was also presented at the 2018 World Raspberry Conference hosted by Bulgaria IRO 2018 (IRO- 2018) and also at Agro Forums and seminars held by the Bulgarian Raspberry Growers Association. Results of the application of this product in berry crops were demonstrated to members of the European Knowledge Exchange Programme NEFERTITI during 2019. Again during 2019, the National Agency for Agricultural Service (NAAS) presented the product at the International Field Days Expert Meeting, organised by the Agricultural University in Plovdiv. A demonstration of the product was also delivered by Balkan Bio Frucht in 2019 in line of the theme of the meeting - "Innovative technology for prevention of diseases and pests and protection from temperature stress in the cultivation of berries (raspberries) and other fruit species through the use of German fruit lime".

### 4.4 Barriers (to implementing the project)

After concluding interviews with both producers and national authorities, one occurring barrier in relation to the implementation of Fruchtkalk was identified. There was a perceivable difference between the views on Fruchtkalk and its effect on people's health. On the one hand, national representatives from the Bulgarian Food Safety Agency shared that at the time the technology was introduced in Bulgaria by Balkan Bio Frucht Ltd., there was not enough accessible information on the product and how it can affect human health. Moreover, they briefly mentioned that the status of the product (basic substance) was an obstacle in itself. On the other hand, the representative from Balkan Bio Frucht (who is also chair of the Bulgarian Association of Raspberry and Berry Producers) shared that at the time, there were ample sources of information on Fruchtkalk, its implementation, safety use, etc., which are still publicly available. He also shared that the main ingredient of Fruchtkalk itself is used in this industry for many years and it is known to producers and farmers. He concluded that a working group was formed after introducing Fruchtkalk on the Bulgarian market, to determine whether it should be included in the National Support Programme "Control of pests in the winter period". However, the final decision of the working group and the involved national authorities was to not include Fruchtkalk in the National Support Programme due to the above mentioned reasons and its status of basic substance (EU fertilizer) in the country. There were 30 different products authorised under National Support Programme "Control of pests in the winter period". National Central authorities argued that they can not accept and authorise Fruchtkalk due to its status as "basic substance" and EU fertilizer, because only plant protection products are financed under the programme. However, after a closer look at

the list of products authorized<sup>3</sup> under the programme it was found that another EU fertilizer, named Carbamid – Urea was authorised. However, this product is synthetic and can not be used in organic/bio farming, leaving bio producers of horticulture crops with no alternative for financing under the programme.

Balkan Bio Frucht decided to propose Fruchtkalk for official product authorisation for organic production with all necessary documents and certificates to the BFSA, but still haven't received any answer yet few years later. Meanwhile, in May 2021, there was a significant scandal around MOCAR 10 (PPP) whose active ingredient is banned for use in the EU. In Bulgaria, as it was allowed for use by the BFSA and 55 tons were found in the country. There was no information about how the product was transported and entered the country. Furthermore, there the BFSA did not provide any information or answer to how the product was used, what the consequences for the surrounding area were and if the required 80 days quarantine period was complied. The producers' representative shared that in their opinion, in Bulgaria, there was and is still a large amount of conservatism and distrust around new means of pest management, including towards Fruchtkalk and a number of other new products, technologies and methods introduced in the last few years, part of the IPM frame.

## 5. Discussion and conclusions

The key points which emerged from the case study of the adoption and the implementation of Fruchtkalk in Bulgaria are the following:

Producers in Bulgaria strongly recommend the use of the product, especially in the case of berry crops, vines and stone fruits. The Association of Raspberry and Berry Producers strongly believes that the product, its benefits and its use should be promoted and encouraged among different types of farmers by relevant local and national authorities.

At the moment, Fruchtkalk is used in Bulgaria, predominantly by berry producers and young farmers, who are not conservative and are informed in nature-friendly technologies and have realized the need to reduce the use of pesticides and mineral fertilizers in Bulgarian agriculture. The use of the product/technology outside these groups of farmers is unclear. Therefore, it is hard to determine to what extent Fruchtkalk is used in Bulgaria.

There seems to be a strong misalignment around the topic of Fruchtkalk and its use in both conventional and non-conventional (bio) farming between national authorities and producers. Producers, such as those from the Bulgarian Raspberry Associations, express strong support for the wider use of Fruchtkalk, its benefits and efficacy when used in both bio and conventional farming. Contrarily, authorities shared that the availability of information and research around the product and its effects on human health is insufficient in order to make further decision or support the use of Fruchtkalk. During the interview, with representative of The Bulgarian Food Safety Agency, they shared that currently they do not possess the authority to determine such matters. On a positive note, they expressed optimism that soon a new working group discussing such matters will be formed, where these barriers could be overcome.

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[https://www.bfsa.bg/userfiles/files/RZ/Programa\\_ovoshtni%20%D0%A0%D0%9E%D0%97%D0%90.pdf](https://www.bfsa.bg/userfiles/files/RZ/Programa_ovoshtni%20%D0%A0%D0%9E%D0%97%D0%90.pdf) (p.35 – Autumn urea/carbamid treatment.).

At this stage, it is difficult to determine what could potentially be done next, as there are perceivable differences between national authorities and producers on the matter. If any change occurs in the near future around the regulation of Fruchtkalk and its use, further investigation through interviews and a survey distributed among farmers could potentially be beneficial for the case study.

According to all participants in the case study, the initiative could be replicated easily to a variety of crops/ production in different countries, as long as specific aspects related to external factors such as climate in the country, soil, etc. are taken into account. The representative of Balkan Bio Frucht Bulgaria strongly recommends the wider use and popularisation of the product on the territory of Bulgaria.

## Bibliography

- NEFERTITI Project - <https://www.naas.government.bg/en/55/59/60> (Accessed on 30/08/2021).
- NEFERTITI Project - <https://nefertiti-h2020.eu/grassland-carbon-sequestration/> (Accessed on 30/08/2021).
- Balkan Bio Fruct Ltd. - <https://www.balkan-bio-frukt.eu/bio-preparati/item/94-fimum-fruchtkalk-ovoshtarska-var> (Accessed on 30/08/2021).
- Invitation to demonstrate on the topic: Innovative technology for prevention of diseases and pests and protection against temperature stress in the cultivation of berries (raspberries) and other fruit species through the use of German fruit lime - <https://www.balkan-bio-frukt.eu/novini/item/108-pokana-za-demonstratziya-na-tema-inovativna-tehnologiya-za-preventziya-ot-bolesti-i-nepriyateli-i-zashtita-ot-temperaturen-stres-pri-otglezhdaneto-na-yagodoplodni-malini-i-drugi-ovoshtni-vidove-chrez-izpolzvane-na-nemska-ovoshtarska-var> (Accessed on 30/08/2021).
- Fruchtkalk in Bulgaria - <http://zemedelskatehnika.com/иновативен-метод-за-защита-на-овощни-к/>.
- MONTAG, J; SCHREIBER, L. UND SCHÖNHERR, J. (2005): An in vitro study on the postinfection activities of hydrated lime and lime sulphur against apple scab (*Venturia inaequalis*). Journal of Phytopathology 153, 485-491. (<https://d-nb.info/978815424/34>).
- MONTAG, J; SCHREIBER, L. UND SCHÖNHERR, J. (2006): An in vitro study on the postinfection activities of copper hydroxide and copper sulfate against conidia of *Venturia inaequalis*. Journal of Agricultural and Food Chemistry, im Druck. (<https://d-nb.info/978815424/34>).
- MONTAG, J; SCHREIBER, L. UND SCHÖNHERR, J. (2006): An in vitro study of the nature of protective activities of copper sulphate, copper hydroxide and copper oxide against conidia of *Venturia inaequalis*. Journal of Phytopathology, im Druck. (<https://d-nb.info/978815424/34>).