Part I – General information

Partner organisation:	**Hellenic Agricultural Organization - "DEMETER"**
Country:	Greece
NUTS2 region:	
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Part III – Details of the actions envisaged.

Please list and describe below the actions that will be implemented in your region as part of the second phase of the project.

ACTIONS

Name	**WP1: Task 1.2 - Stakeholders' identification and requirements collection** **WP2: Task 2.1 - Pilot specifications, design, and planning**
Planned activities	**Task 1.2:** Involves the identification and interview of circa 20 stakeholders to complete a questionnaire. Stakeholders will be identified mainly by DEMETER, while some of them will be proposed by RDFCM, who will approve all of them. The questionnaires and the interviews will be designed and carried out on-site by DEMETER and questionnaires will be approved by RDFCM. All questionnaires will be analysed by DEMETER and stored online. **Task 2.1:** Involves the collection of available data on the rice sector workflow, data management and sharing principales of communications with stakeholders and end-users. Second, this task executes a requirement study that will identify key requirements to be addressed within the pilot form the stakeholders and end-users. This task will be led by DEMETER and assisted by RDFCM.
Challenge addressed	
Interregional inspiration	
Players involved	*DEMETER, RDFCM, CERTH*
Timeframe	*1M to 8M & 9M*
Costs	
Funding source(s)	
Urban-rural aspects	
Innovative character	*Initial data collection to be implemented into the blockchain*
Date	*June 2021*

Deliverables 1.2 & 2.1

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1. Introduction to blockchain technology

Figure 1 Blockchain schematics

Blockchain technology offers many benefits, as it can provide a secure, distributed way to perform transactions among different untrusted parties (Yuan, et al. 2019), (Pearson, et al. 2019), (Creydt en Fischer 2019). This is a key element in agriculture and food supply chains, where numerous actors are involved from the raw production to the supermarket shelf (Lin, et al. 2017), (Tripoli and Schmidhuber 2018). To improve traceability in value chains, a decentralized ledger helps to connect inputs, suppliers, producers, buyers, regulators that are far apart, who are under different programs, different rules (policies) and/or using different applications (Lee, et al. 2017). Via smart contracts, manufacturers can develop scalable and flexible businesses at a lower cost, and the overall effectiveness of manufacturing services can be improved (Li, et al. 2018). Blockchain has the potential to monitor social and environmental responsibility, improve provenance information, facilitate mobile payments, credits and financing, decrease transaction fees, and facilitate real-time management of supply chain transactions in a secure and trustworthy way (Lee, et al. 2017). In the case of an outbreak of an animal or plant disease, contaminated products could be traced more quickly (Tripoli and Schmidhuber 2018). Blockchain could even be used to make agricultural robotic swarm operations more secure, autonomous and flexible (Ferrer 2018).

In particular, blockchain existing problems such as unfair pricing and the influence of big companies have historically limited the environmental/economic sustainability of smaller farms. Blockchain could help in a fairer pricing through the whole value chain. An example of how blockchain could be used for record-keeping of water quality data along a catchment area is discussed in (IWA 2018).

Moreover, the potential transparency provided by blockchains could facilitate the development of trading systems that are based on reputation. Reputation, as we have witnessed from various other trading systems where it has been used (e.g. eBay, Alibaba), improves the behavior of participating parties and increases their reliability, responsibility and commitment (Khaqqi, et al. 2018), (Sharma 2017).

Further, there is the potential benefit of increasing consumer awareness and empowerment, considering that the consumer is the market driving force. Consumer increased awareness would put pressure for more transparent, sustainable, safe and fair practices in food production. Since consumers are overwhelmed by the amount and complexity of certification labels, blockchain technology seems to have positive influences on consumers' purchasing decisions (Sander, Semeijn and Mahr 2018). Finally, the case study performed in (Perboli, Musso and Rosano 2018) shows that the cost of implementing a blockchain is highly sustainable when compared with the resulting benefits.

Blockchain has the potential to monitor social and environmental responsibility, improve provenance information, facilitate mobile payments, credits and financing, decrease transaction fees, and facilitate real-time management of supply chain transactions in a secure and trustworthy way (Lee, et al. 2017). In the case of an outbreak of an animal or plant disease, contaminated products could be traced more quickly (Tripoli and Schmidhuber 2018). Blockchain could even be used to make agricultural robotic swarm operations more secure, autonomous, and flexible (Ferrer 2018).

2. Introduction to pilot design and questionnaire distribution strategy

The rice local case in Greece includes two major rice cultivation areas, Thessaloniki and Serres (Figure 2) both located in Central Macedonia region, where rice cultivation represents almost 80% of the Greek rice area. Due to the traditional close collaboration of DEMETER with local farmers around Thessaloniki, the project can derive accurate data from the collaborated trusted rice farmers. After presenting RUMORE Pilot Actions In the rice dedicated area, big interest is expected due to the innovation of the blockchain and the digital innovation hub and it is predicted that more farmers will become potential stakeholders of the pilot, which will also facilitate the future continuation of the service.

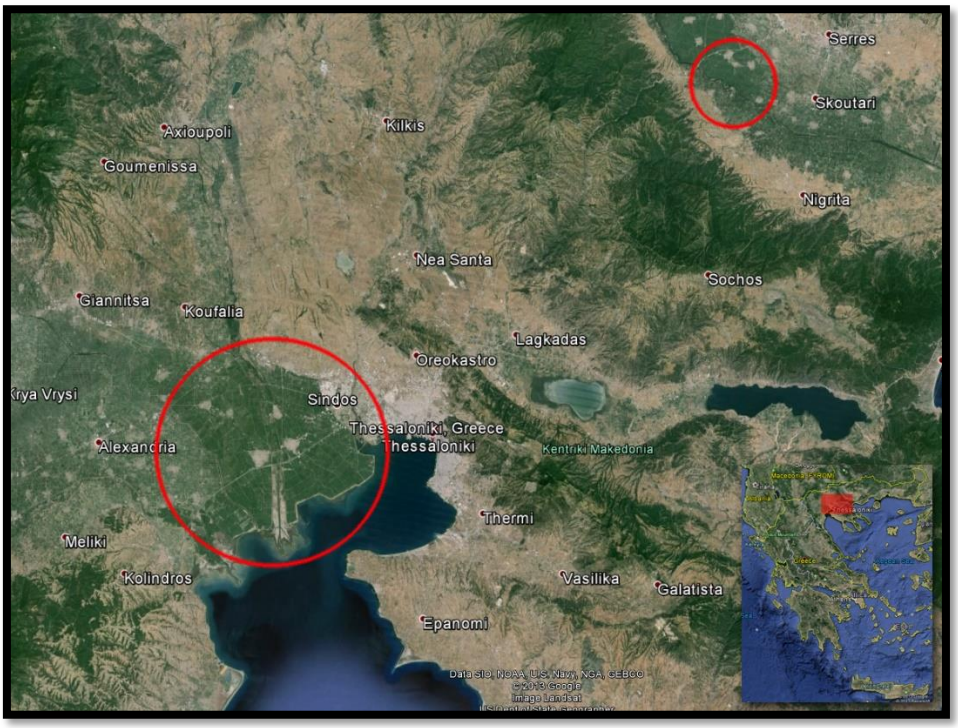

Figure 2 Main rice cultivation areas of Greece included in the local case study. (https://www.google.com/maps)

The effort of building up the pilot started with the kick-off meeting, which was held at RCDFM on the 20th of July 2020. The RUMORE pilot actions were presented in all stages. Moreover, digital innovation hubs (DIH) and blockchain technologies were presented and explained, thoroughly. This effort continued by bilateral meetings, consultations, and direct conducts with the stakeholders, despite the COVID19 restrictions and limitations. In most cases, these meetings led to the identification of the **Key Actor "Agricultural Association of Chalastra A' " (Chalastra A).** More thorough discussions were carried out with RCDFM, DEMETER and the president of the association, **Mr. Christos GANTZARAS**. Furthermore, he had to ask for the agreement of the collaboration of the association's board meeting, and finally they agreed to participate in the RUMORE pilot project in favor of the designing and completion of the actions at the stakeholders' and end-users (customers) level. Besides, after bilateral meeting with RCDFM and DEMETER, a strategic plan was drawn, in the terms of the variety selection, and cultivar **"GLORIA"** was decided to be the RUMORE pilot variety. Also, Chalastra A suggested to proposed and selection rice farmers. These farmers should be professional responsible in their businesses and very well organized concerning their cultivation activities, so the data collected to be appropriate and antiquate for their participation in the Pilot Action scenario. The scenario should cover the participation of these farmers/stakeholders in the collection of critical for the project data, such as the cultivation practice data, derived from their cultivation diary and the delivery of the dedicated to RUMORE harvest to the designated location belonging to Chalastra A. Moreover, the association proposed and planed the way of handling of the 10 individual RUMORE harvested rice products (at least 1 ton grain delivery per rice farmer), in the terms of storage, drying, and final storage site. Special care should be taken during delivery and srorage to avoid any contamination with delivered rice grains outside the pilot actions. Furthermore, besides Chalastra, initially, other stakeholders were identified that could be key actors.

3. RUMORE pilot key actor and other stakeholders' presentation

Agricultural Association of Chalastra A'

Chalastra A (key actor) (*https://www.chalastrarice.gr*), founded in 1917, is one of the biggest associations in the area with almost 500 members. Besides, it holds is a vertical circle of business, starting with sowing grains trading, agrochemicals, farmers' agro-assistance, collection of harvested grains, drying, storage facilities of approximately 40000 t and packaging. Moreover, it operates two supermarkets in Chalastra city, which is a big advantage for facilitating the distribution of the RUMORE pilot rice products. The key actor was identified during the kick-off meeting of the Pilot Action and final synergy was

Figure 3 Mr Ch. Gatzaras (president of Chalastra) image is taken during RUMORE visit by D. Katsantonis)

agreed during a bilateral meeting, which was carried out locally by meeting the President of the association with RDFCM and DEMETER.

Figure 4 The headquarters of the Agricultural Association of Chalastra A' (image free source from https://www.chalastrarice.gr/en/)

Figure 5 Images of the Chalastra A activities: i) top images: The two supermarkets ii) middle images: inside of the supermarkets and rice shelves iii) bottom images: packaging facilities (images free source https://www.chalastrarice.gr/en/)

BEGAS AGRO SA

BEGAS AGRO (*http://www.begasagro.gr*), is a vertical company specialized in the integrated production of rice seeds and rice product (brown, white and parboiled products), as well as in the rice milling, trading, packaging, and distribution of agrochemicals. **Mr. Stavros BEGAS** claimed that he is interested in the ideas of traicability and product monitoring. However, he expressed his concerns about the profitability of the blockchain towards the prices that end-users are ready to pay. He agreed to participate in the RUMORE pilot's essay, and he offered to collect grains in favour of the project and to distributed with after packaging with the QR code. AS a result, he advised the consortium concerning the industrial specifications of the rice product end-users require during trading and exports. The information he provided were very valuable for the completion of the industrial (secondary production) questionnaire.

Figure 6 Mr S.Begas president of Begas Agro SA, image is taken during RUMORE visit by D. Katsantonis)

Figure 7 BEGAS AGRO SA industrial facilities (image free source from https://www.begasagro.gr)

Figure 8 BEGAS AGRO products (image free source from https://www.begasagro.gr)

Georgios KRAVVAS

Mr. Kravas is an agronomist, rice farmer, organic rice farmer, general manager of the rice organic farming cluster called “KAGRO” and rice trader/exporter. He cultivates more than 200 ha of rice and 30 of an organic one. Mr. Kravvas due to his work on organic farming and organic products trading was well informed concerning the traceability and blockchain technologies. Mr. Kravvas agreed to contribute to the pilot actions of RUMORE pilot.

Figure 9 G. Kravvas headquarters in Chalastra and facilities (https://www.google.com/maps)

Dimitris KANAKAS

Mr. Kanakas (*http://www.kanakas.gr/en/*), is a milling and packaging industry and a trader, specialized in exporting Greek rice.

Figure 10 D. Kanakas rice mill facilities (https://www.google.com/maps)

Figure 11 Kanakas rice products (image free source from http://www.kanakas.gr/en/)

Sotirios TZAFERIS GP

Mr. Tzaferis owns a medium size rice milling industry in Sindos. His mill produces brown and white rice products. After he was informed about the DIH and blockchain technologies he agreed to contribute to the RUMORE pilot actions.

Figure 12 S. Tsaferis rice mill facilities (https://www.google.com/maps)

Throughout the key actor and stakeholders networking, the advantage of direct contacts with more farmers or groups of farmers was greatly expanded. The project started to become more and more recognizable within the local study area, because of the meetings, especially after the collaboration with Chalastra A. In general, the strategy was suggested by DEMETER and granted by RDFCM; close collaboration in the framework of the project's work-plan with key farmers (farmer leaders proposed by the Key Actor and DEMETER), who can manage and control wide rice cultivation areas and own innovating and reliable agricultural machinery,keeping detailed records of their work-flow. Also, these stakeholders, from the dissemination point of view, could influence a great number of rice growers within the rice local area. This kind of close and direct contacts and collaborations with farmers have been followed by Demeter for more than 20 years in Kalochori experimental station, in favour of many EU projects (SmartPaddy, RiceGuard, ERMES, DEMETER on-going), collecting directly data from the stakeholders.

4. Pilot specifications, questionnaire, and data collection

The meetings have been conducted by personal contact and phone interviews. Furthermore, half of the farmers were designated by Chalastra A and the other half by DEMETER. In general, the RUMORE pilot farmers were informed by DEMETER about the project (concept, scope, aims, milestones ect), and they agreed to participate. Thus, they became the main core of the pilot. Moreover, they agreed to complete the questionnaire for the data collection, and they were interviewed after the completion of rice harvesting period. Carrying out the pilot survey was part of the pilot specifications definition, project dissemination, and strategic plan road map.

The regional stakeholders/farmers involved in the RUMORE pilot project are presented in Table 1 and they have completed the pilot primary production questionnaire.

Table 1: Information concerning the collection of grains for sowing and grains delivered after harvesting

Entity	Typology
1. PLASTIRAS Christos (cv GLORIA)	Major farmer in Kalochori. He and his family cultivate approximately 300 ha and operate another 500 ha
2. GANTZARAS Christos (cv GLORIA)	President of the Agricultural Association Chalastra A'
3. DIMOUDIS Georgios (cv GLORIA)	Rice farmers
4. KOUIMTZIS Leonidas (cv GLORIA)	Vice President of the Agricultural Association Chalastra A'
5. BATSIOLAS Filippos (cv GLORIA)	Young farmer running rice family business
6. VAGGELOPOULOS Nikolaos (cv GLORIA)	Rice farmer
7. MOSHOS Polychros (cv GLORIA)	Rice farmer
8. TSIMPOS Ioannis (cv GLORIA)	Agronomist of the Agricultural Association Chalastra A'
9. KRAVVAS Georgios (cv GLORIA)	Rice farmer/agronomist, president of rice organic farming cluster and trader
10. GKOUTAS Panagiotis (cv GLORIA)	Member of board of the Agricultural Association of Agios Athanasios
11. VASILIADOU Soultana (cv GLORIA)	Rice farmer
12. ZAVAROPOULOS Theodoros (cv GLORIA)	Rice farmer
13. KITSOUKIS Fotios (cv RONALDO)	Rice farmer
14. MIHAILOGLOU Panagiotis (cv OLYMPIADA)	Rice farmer
15. PAPADOPOULOS Isidoros (cv LUNA)	Rice farmer
16. PLASTIRAS Christos (cv LUNA)	Rice farmer
17. PLASTIRAS Christos (cv OLYMPIADA)	Rice farmer
18. PLASTIRA Christos (cv RONALDO)	Rice farmer
19. PLASTIRA Christos (cv SIEL)	Rice farmer
20. Sideris Ioannis (cv OLYMPIADA)	Rice farmer
Rice milling industry actors	
21. GOGOS Ioannis	Chalastra A, manager of commerce
22. TZAFERIS Sotirios	Sotirios Tzaferis GP
23. PAPANTONIOU Theofilos	Begas Agro SA

5. Primary production survey

Preparation

All questions for the data collection were initially designed by DEMETER to define the pilot specifications for rice. All derived experience of DEMETER came through as the leader of data/specifications collection and dissemination work packages and tasks had carried out several essays in past EU projects such as SMARTPADDY, ERMES, RICEGUARD and ERMES (FP7). In the current cases, the hypothesis was the through the questions the pilot to be able to collect from the stakeholders' useful data concerning the RUMORE dedicated rice paddies, those would be entered in the blockchain service and would be of interest to the end-users (consumers). Besides DEMETER, all partners proposed additional questions according to their needs. The questionnaires were submitted to RCDFM for final approval.

All surveys were conducted by DEMETER in the Greek language by **contacted with 20 regional actors (stakeholders-farmers), 3 rice milling industry actors and 5 strategic roadmap questionnaires. Analysis of the last category questionnaires is not showed in the current deliverable, and they were delivered to RCDFM for Task 1.4 completion.** It provided the initial trends of the requirements, while many data were collected concerning the pilot study area. The survey is very critical for the beginning of the development of the traceability service during the pilot time. Activities will be more intensive and sustained after the collection of the first year's results, while the prototypes of the service will be disseminated during its development phase.

The questioner was distributed among rice farmers, mainly from the Chalastra, Kalochori and Agios Athanasios rice cultivation regions, who cultivated mainly rice during the 2020 cultivation period. Most of the participating rice growers were male, aged from 41 to 60 years old and all of them resided in a rural area. Furthermore, they all had access to the internet and almost all of them (80%) had smartphones, while 70% claim that they use mobile data. Their level of e-government usage varies as almost 50% do not really use these services, while the other half uses them a lot more often, so much so that 40% claim a high level of usage.

They followed similar cultivation practices, most of them performed only one topdressing fertilization and only 15% used certified seeds for sowing. Their paddies' soil for the most part ranged from sandy to sandy-loam and the size of their fields vary greatly from less than 1.5 ha to more than 4.0. Finally, most of them had no quality certification, such as organic rice, and only 40% had AGRO certification.

The primary production questionnaire translated in English language.

Name and Surname:

Please enter your Email (provided you have one):

Demographics

WHAT IS YOUR AGE

☐ 20-30
☐ 31-40
☐ 41-50
☐ 51-60
☐ 61+

GENDER

☐ Female ☐ Male

RESIDENTIAL AREA

☐ Urban ☐ Rural ☐ Remote

TYPE OF MOBILE PHONE

☐ Smartphone
☐ Cellphone

DO YOU USE MOBILE DATA

☐ Yes
☐ No

DO YOU HAVE ACCESS TO INTERNET

☐ Yes
☐ No

LEVEL OF E-GOVERNMENT USAGE

☐ No use ☐ Low ☐ Medium ☐ High

A. Field Preparations

Paddy 1, Google Maps Coordinates:

A1. Previous crop for paddy 1

A.1.1 Rice

A.1.2 Fallow

A.1.3 Winter cereals

A.1.4 Maize

A.1.5 Alfa Alfa

A.1.6 Trifolium

A.1.7 Cotton

B Sowing

B.1 Do you use certified seeds?

Yes ☐

No ☐

B2 Cultivar Type	
B3 Sowing Date:	
B4 Quantity of seed sowed (variety & kg/1000m^2)	
B4.1 Paddy size for paddy 1 (ha)	
B4.2 Paddy size for paddy 2 (ha)	

C Soil type

C1 Sandy ☐

C2 Sandy-Loam ☐

C3 Loam-Clay ☐

C4 Clay ☐

Other... ☐

D. Fertilization

D.1 Basic Fertilization: (date)

D1.1 Nitrogen (quantity in kg/1000m²):

D1.2 Phosphorus (quantity in kg/1000m²):

D1.1.3 Potassium (quantity in kg/1000m²)

D1.1.3 Other ..... (quantity in kg/1000m²) .....

D.1.2 First topdressing fertilization: (date)

D1.2.1 Nitrogen (quantity in kg/1000m²)

D.1.3 Second First topdressing fertilization: (date)

D1.3.1 Nitrogen (quantity in kg/1000m²)

E1. Do you have any quality certification?

E.1.1 Biological

E1.2 AGRO

E1.3 No certification

Data rice quality collection sheet (on-going).

This sheet will collect data concerning the quality characteristics of each individual sample collected by each pilot stakeholder, who delivered grains within the framework of the RUMORE pilot. The competion is istill undergoing because the data will be collected after laboratory analysis. Afterwards, they will be delivered to the blockchain database.

Seed Quality Characteristics (for the specific sample)

Total milling yield	
Whole milling yield	
Crystallization (%)	
Amylose content (%)	
Paddy rice length (mm)	
Paddy rice Length/Width ratio	
Brown rice Length	
Brown rice Length/Width ratio	

Nutritional Value (ELGO-DEMETER + CERTH)

Energy (Kcal)	
Proteins (gr)	
Fat (gr)	
Carbohydrates (gr)	
Sugars (gr)	
Fibers (gr)	
Iron (mg)	
Phosphorus (mg)	
Potassium (mg)	
Zinc (mg)	
Thiamine (B1 Vitamin) (mg)	
Vitamin B2 (mg)	
Vitamin B3 (mg)	
Vitamin B5 (mg)	
Vitamin B 6 (mg)	

Secondary production questionnaire

DEMETER with the help of RCDFM and CERTH developed a secondary production questionnaire to be completed by rice industry and traders. The questionnaire was finally approved by RCDFM. The data of the stakeholders will further define the specifications of the blockchain service and help to collect information concerning the status of the rice milling industry regarding the needs of the end-users/customers.

Demographics

WHAT IS YOUR AGE

☐ 20-30
☐31-40
☐ 41-50
☐ 51-60
☐ 61+

GENDER

☐ Female ☐Male

RESIDENTIAL AREA

☐ Urban ☐Rural ☐Remote

TYPE OF MOBILE PHONE

☐ Smartphone
☐ Cellphone

DO YOU USE MOBILE DATA

☐ Yes
☐ No

DO YOU HAVE ACCESS TO INTERNET

☐ Yes
☐ No

LEVEL OF E-GOVERNMENT USAGE

☐ No use ☐ Low ☐Medium ☐High

1. Type of business:
    a. Cooperative
    b. Mill
    c. Merchants
    d. Supermarket
    e. Other……

2. Do you have any Quality Certification?
    a. ISO
    b. HACCP

3. Do you process/deal with other products except rice?
    a. Corn (Maize)
    b. Legumes
    c. Other……

4. Means of recording and distributing product data in your enterprise

5. Means of locating products that do not meet company standards

6. Do you have to file special HACCP reports?

7. Frequency of HACCP reports?

8. Do you have paperwork for incoming products?

9. Do you inspect loading and unloading vehicles for conditions of hygiene?

10. Do you record and monitor the main production procedures?

11. Does your equipment for monitoring and recording production meet the national standards?

12. Does your company make sure that none of the purchased products are susceptible to:
    a. fraud
    b. forgery
    c. dilution
    d. substitution

e. concealment
f. improper certification
g. grey market

13. Do you use special packaging to protect your products during transport from spoiling?

14. Do you continually monitor the temperature of the vehicles during transport?

15. Do you make sure that none of your products comes in contact with allergens?

16. Do you monitor your products for metallic or other foreign objects? If yes, how often?

17. Do you make sure that your products are GMO free?

18. Can you say that your end products are safe from:
    a. Nuts
    b. Walnuts
    c. Sesame
    d. Lupine
    e. Soy
    f. Lactose
    g. Eggs
    h. Other cereals
    i. Fish / shells / clams
    j. Sulfites

19. Do you have in your logistic and transport areas a certified program for disinfestation?

20. Do you perform the disinfestation yourself or do you use a third party?

21. Do you have specialized scientific personnel capable of detecting infestations?

22. Do you have a safety technician employed in your company?

23. Is there a doctor present in the premises of your company?

24. Do you have and maintain a record of the cleaning schedule and the conditions of hygiene in your company?

25. Do you employ a third company to do the cleaning?

26. Do you use food grade cleaning products?

27. Are your employs trained so as to keep the work areas clean?

28. Do you keep a record of the types of illnesses your employs might have?

29. Have you taken special precautions in case one of your employees is infected with covid-19?

30. Are your precautionary measures, against covid-19, in accordance with the national legislation?

Strategic roadmap questionnaire

The third questionnaire was developed by RCDFM with assistance by DEMETER. The questionnaire was completed by five stakeholders but in the next months it is planned to be more developed though a workshop with the participation of more stakeholders to analyse the strategic road map.

Demographics

WHAT IS YOUR AGE

☐ 20-30
☐31-40
☐ 41-50
☐ 51-60
☐ 61+

GENDER

☐ Female ☐Male

RESIDENTIAL AREA

☐ Urban ☐Rural ☐Remote

TYPE OF MOBILE PHONE

☐ Smartphone
☐ Cellphone

DO YOU USE MOBILE DATA

☐ Yes
☐ No

DO YOU HAVE ACCESS TO INTERNET

☐ Yes
☐ No

LEVEL OF E-GOVERNMENT USAGE

☐ No use ☐ Low ☐Medium ☐High

1. In what sector is the most important need of your company today?
    a. in product making,
    b. in product distribution,
    c. in selling the products,
    d. in human resources,
    e. other (please specify) - .....

2. What challenges do you face?
    a. increase in material cost production (consumables)
    b. increase in production cost (cost of machinery)
    c. energy consumption
    d. personnel cost
    e. reduced profits due to competition,
    f. difficulty in entering new or more developed markets
    g. other (please specify) - .....

3. Do you have an in-house IT department, or manager?
    □ yes □ no

4. Do you use any of the following digital tools?
    a. ERP
    b. CRM
    c. E - shop
    d. e - conferences
    e. Data Analytics, visualization.....
    f. digital tool for application on cultivation practices
    g. digital tool for monitoring parameters (e.g., meteorological, soil, etc.)
    h. none of the above
    i. other (please specify) - .....

    If yes, in what way?
    a. cloud
    b. local

5. Have you invested in digital infrastructure, hardware, software?
    □ yes □ no

    If yes, what amount have you invested?
    a. 0 – 2000 €
    b. 2000 € – 5000€
    c. 5000 € – 10000 €
    d. > 10000 €

    What kind of needs did you want to cover?
    a. in the implementation of cultivation practices,
    b. in production monitoring,
    c. in distribution,
    d. in processing,
    e. in sales,
    f. in human resource management
    g. other (please specify) - .....

If no, are you planning to invest or spend on digital tools?
□ yes □ no

If yes, what amount are you planning to invest?

a. 0 – 2000 €
b. 2000 € – 5000€
c. 5000 € – 10000 €
d. > 10000 €

What needs will you meet?

a. in the implementation of cultivation practices,
b. in production monitoring,
c. in distribution,
d. in processing,
e. in sales,
f. in human resource management
g. other (please specify) - .....

6. Are there are any problems in the services / products you provide?
□ yes □ no

7. Are you satisfied with your traceability system?
□ yes □ no
If no, what issues do you want to solve?

a. Electronic monitoring of the flow of production processes
b. Real-time monitoring of processes
c. Minimize human intervention
d. Quality Control Management
e. Cooperation with existing business systems
f. Emergency management
g. g. Scalability, flexibility, usability
h. other (please specify) - .....

8. Are you familiar with the Blockchain system?
□ yes □ no

Do you think you need it?

□ yes □ no

9. Do you collaborate with a research organization?
□ yes □ no

If no, do you need a specialized service from a research organization?
□ yes □ no
If yes, why don't you implement it?

a. High cost
b. Lack of guidance
c. Luck of time
d. other (please specify) - .....

10. Do you need to create an identity for your products;

□ yes □ no

If yes, what kind of identity do you want to create?

a. biochemical
b. genetical
c. geographical
d. other (please specify) - .....

11. Do you need to highlight the nutritional value of your products?

□ yes □ no

If so, have you done it?

□ yes □ no

If not, why not?

a. Due to cost
b. Lack of know-how
c. Lack of guidance
d. other (please specify) - .....

12. Do you face problems of counterfeiting related products from your competitors in Greece and abroad?

□ yes □ no

13. Are you planning on creating a new product or service in the immediate future?

a. New product
b. Service related to
   b1 cultivation practices
   b2 sales
   b3 processing
   b4 reuse of by-products
c. other (please specify) - .....

14. How much has the pandemic affected you?

a. New challenges
b. New opportunities
c. New problems

15. Have you noticed a change in the consumers habits towards your products, due to the pandemic?

□ yes □ no

If yes, what kind of changes?

a. increase in consumption
b. decrease in consumption
c. purchase of products through e-shop
d. I do not know / I do not wish to answer

6. Primary production survey results

Demographics

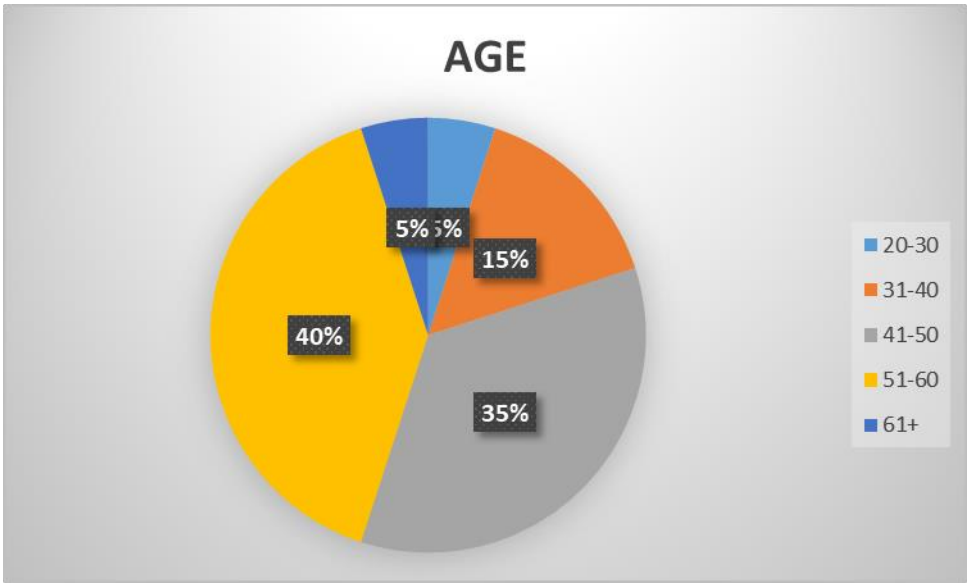

Figure 13 Age distribution among the participating farmers

The highest percentage of farmers (75%) were 41 to 50 and 51 to 60 years old, while the percentage between the two groups was 35% and 40%, respectively. Only, 15% of the rice growers were between 31 and 40 years. Finally, 5% of the interviewed rice producers were older than 61 years old, while the same percentage applied to the youngest farmers (21 to 30).

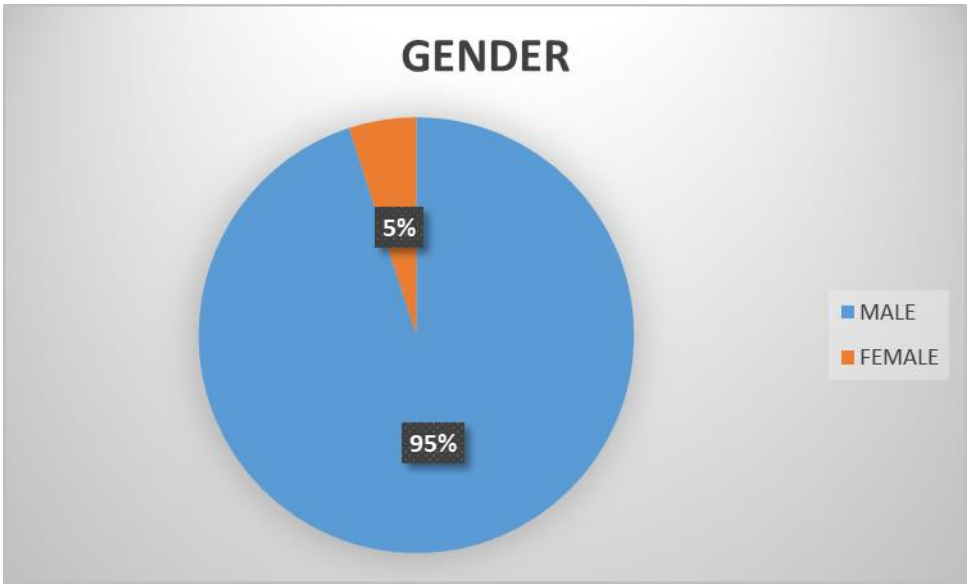

Figure 14 Gender distribution of the participating farmers

Agriculture, as a profession is usually performed by the male population, where almost the entire group of the interviewed farmers (95%) were male, except 5% who were female.

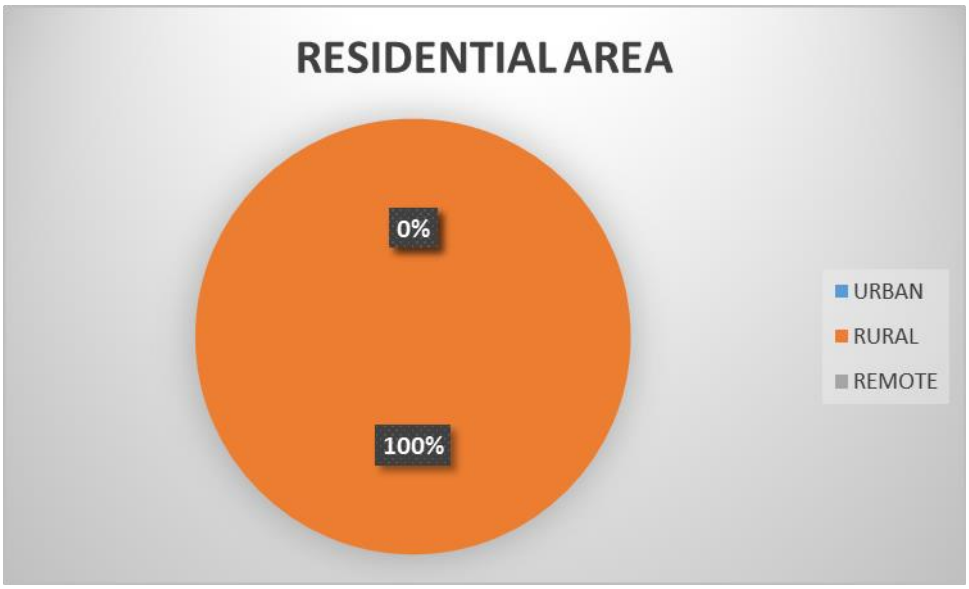

Figure 15 Residential area distribution of the participating farmers

All interviewed rice growers were residing in rural areas (100%). Something that was expected, since urban environments and remote areas are not suitable for farmers who need easy access to their fields and enough space to store their machinery, seeds and agrochemicals.

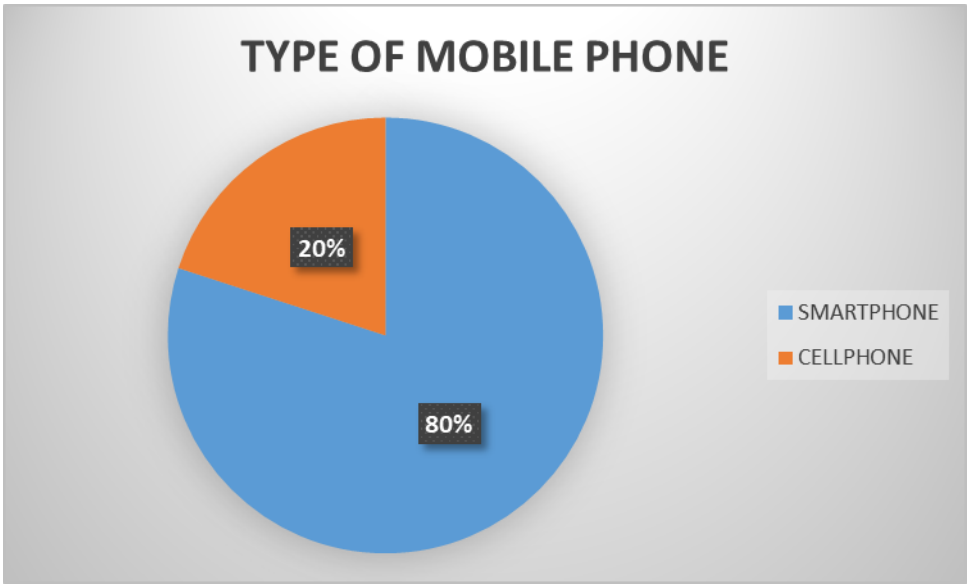

Figure 16 Percentage of smartphone vs cellphone ownership and usage among farmers

A high percentage of the interviewed farmers (80%) answered that they own and operate a smartphone, while 20% answered that they use a cell phone.

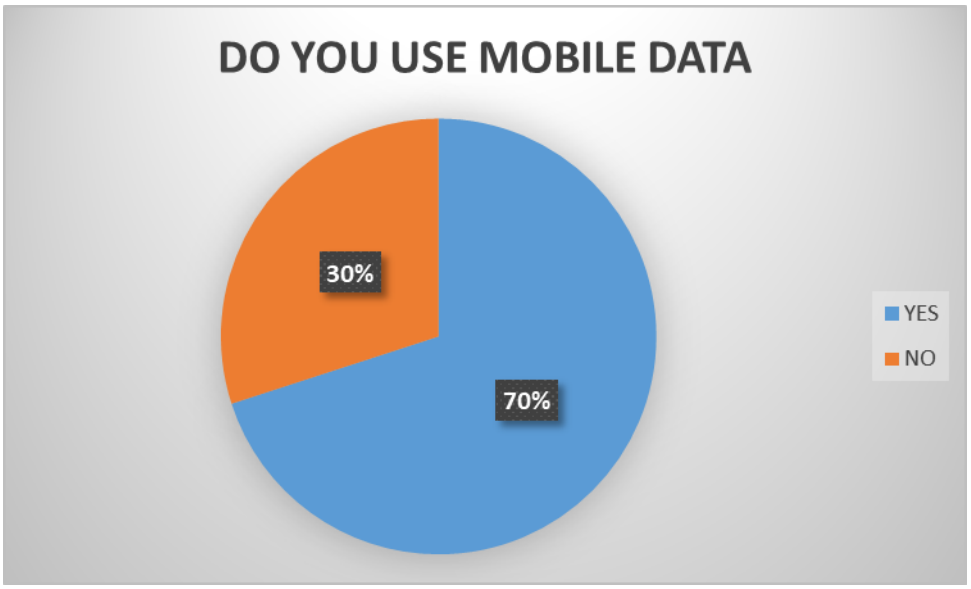

Figure 17 Percentage of mobile data usage among farmers

Most of the farmers (70%) answered that they use mobile data daily, while 30% answered that they don't use or simply they don't want to.

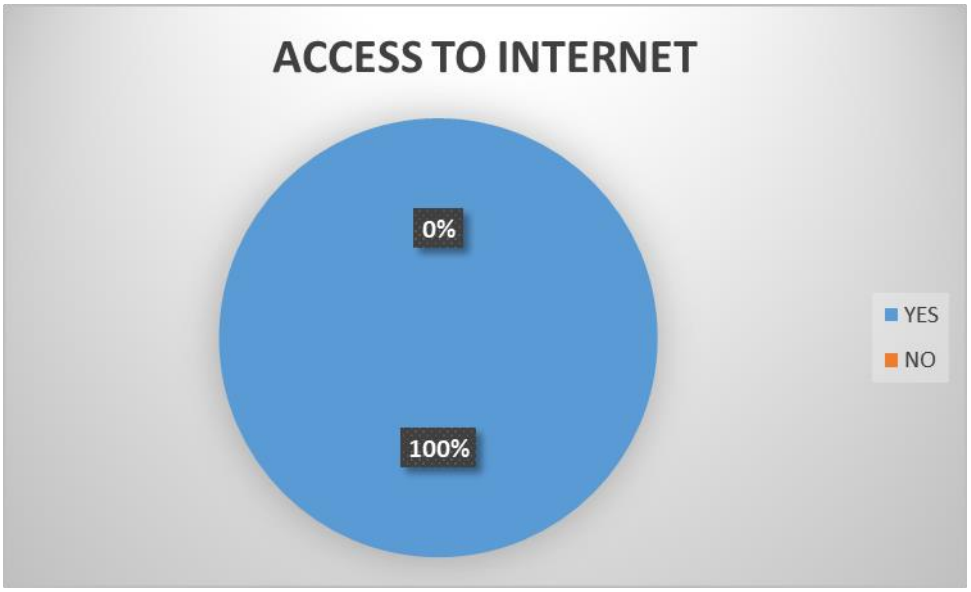

Figure 18 Percentage of farmers with access to the internet

All rice growers answered that they have access to the internet.

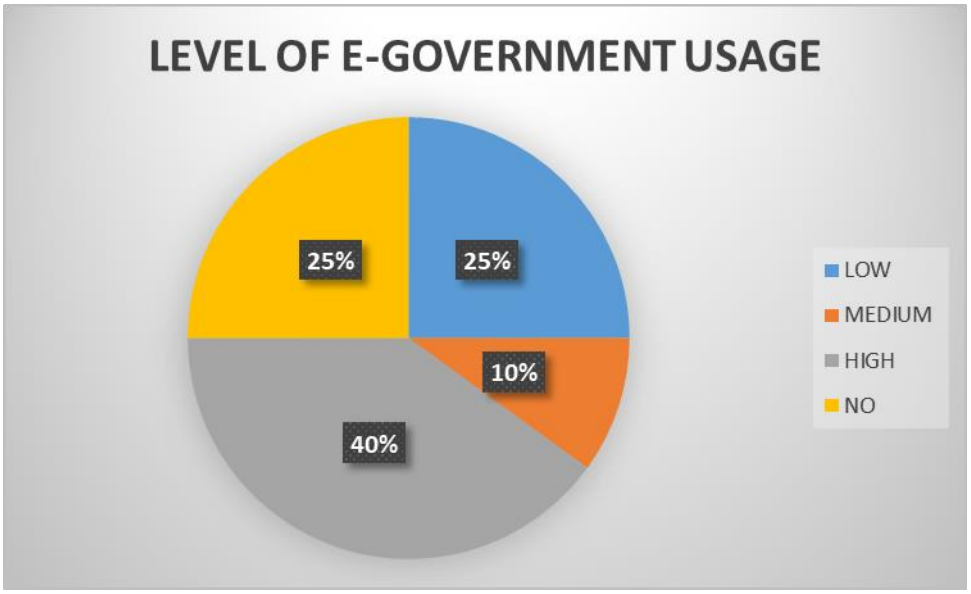

Figure 19 Percentage of farmers who use e-government services and at what level

Almost half of the rice producers (40%) answered that they use e-government services and at a high level, while 10% claim that they use them moderately. On the other hand, 25% answered that their level of understanding and using e-government services is low, while another 25% do not use them at all.

Field Preparations For Previous Year Crop

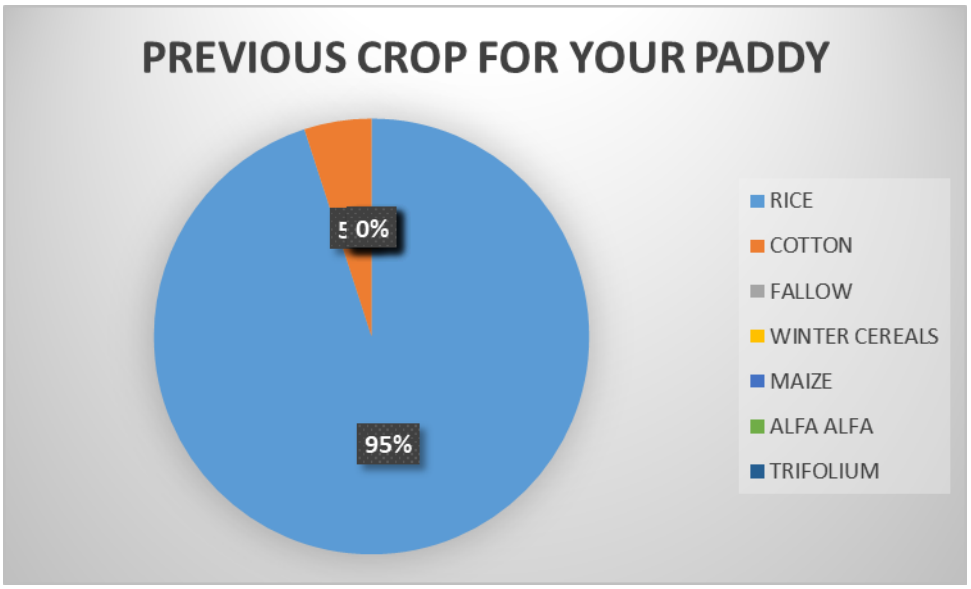

Figure 20 Last season's crop distribution

Almost all the participating farmers, 95% cultivated rice the previous year and only 5% cultivated cotton.

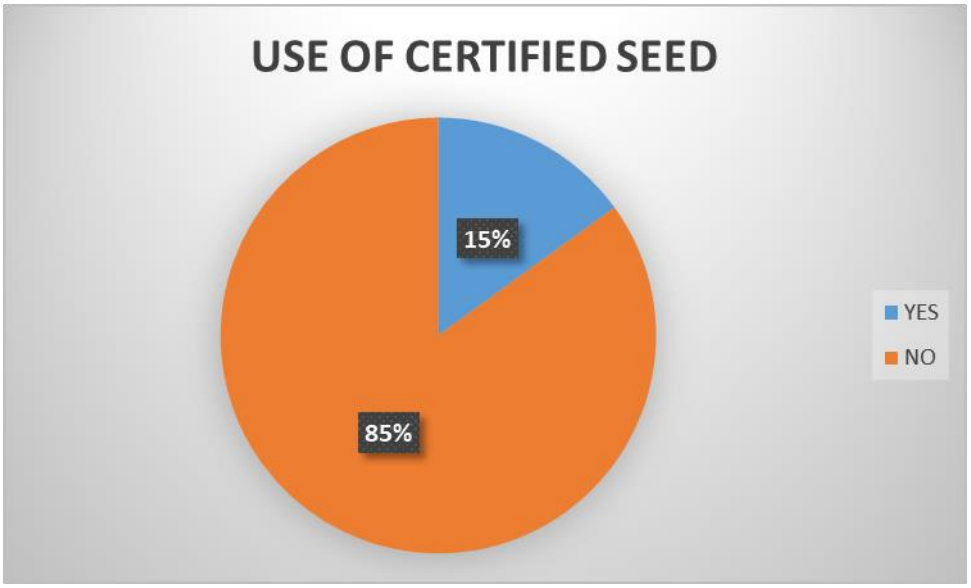

Figure 21 Use of certified seed distribution among the farmers for the previous year

Most of the farmers (85%) did not use certified sowing grains for sowing their paddies, while only 15% used certified grains. However, most of them claimed that they buy certified seeds once every two to three years and scarcely ever every four years.

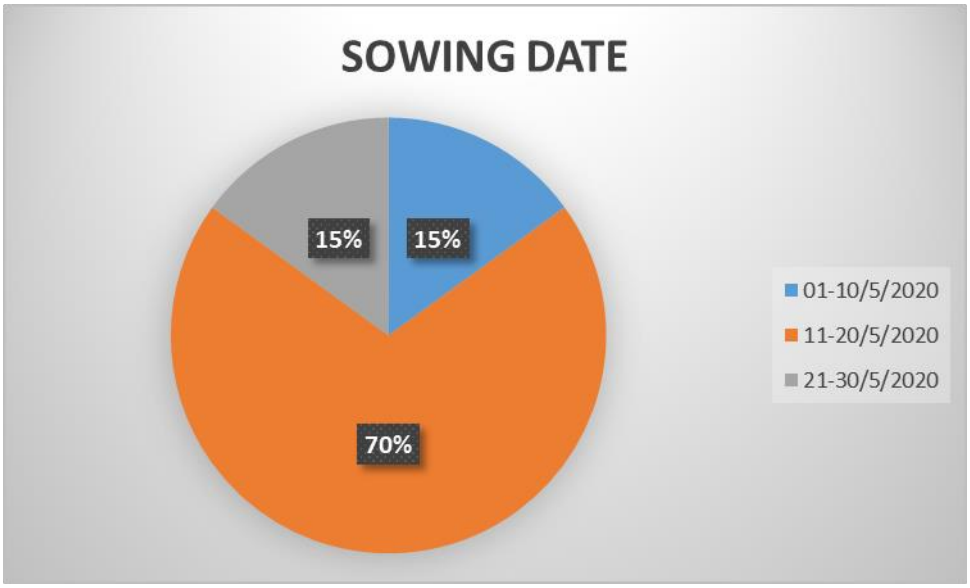

Figure 22 Farmers' choice of sowing date

Most of the farmers (70%) sowed from the 11th to the 20th of May, while only 15% sowed early in the season, (from the 1st to the 10th of May) or late in the season (from the 21st of May to the 30th of May).

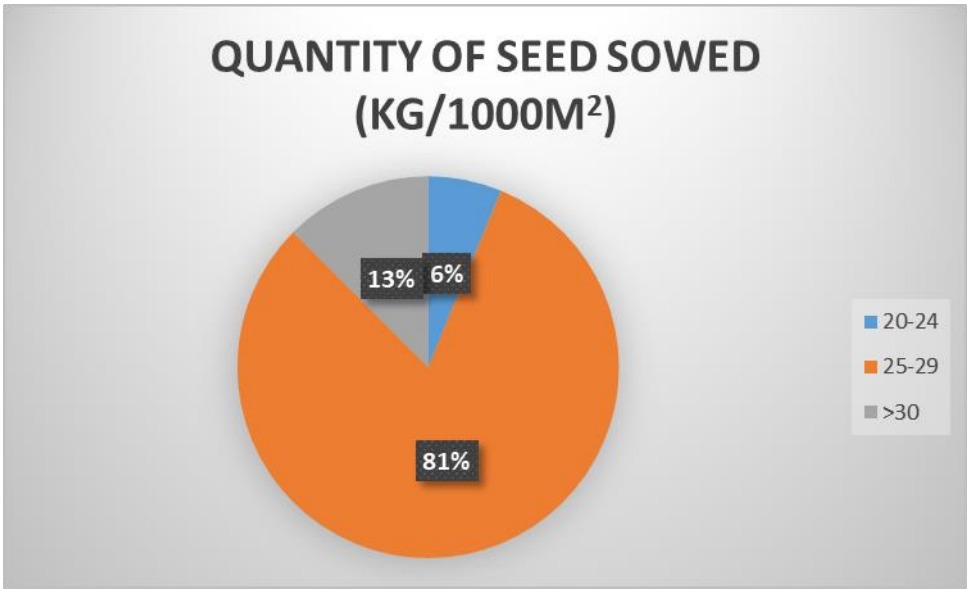

Figure 23 The quantity of seeds sown per 1000m2 for the previous year

Most of the farmers (85%) sowed 25 to 29 kg of seeds per 1000 m^2, while 13% used over 30kg and only 6% used 20 to 24kg of seeds per 1000m^2.

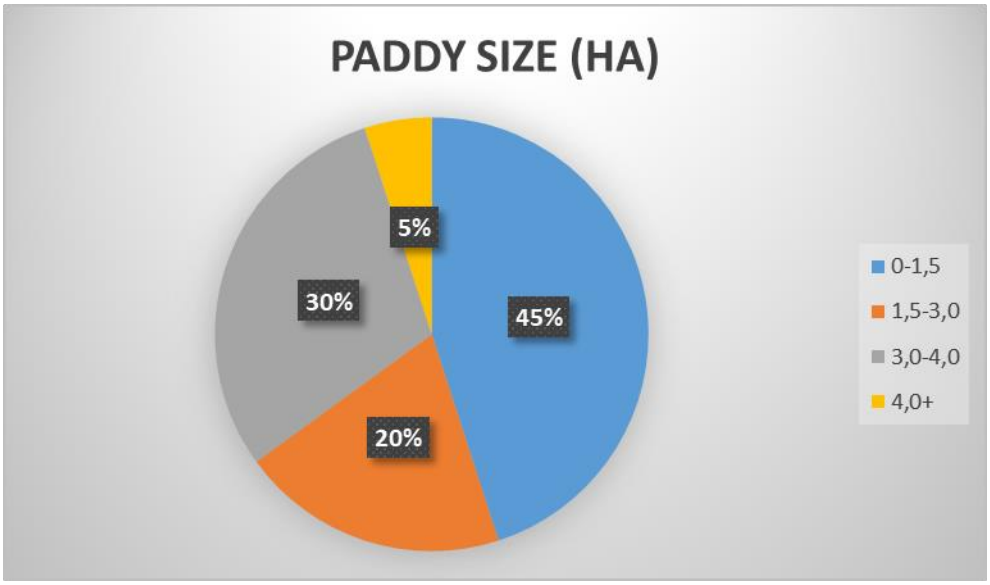

Figure 24 Average size of cultivated field for specific paddy

When asked about the size of their paddies, 45% of them answered that their paddies range from 0 to 1.5 ha and another 30% 3.0 to 4.0 ha. Furthermore, 20% answered that their paddies were 1.5 to 3.0 ha and only 5% more than 4.0 ha.

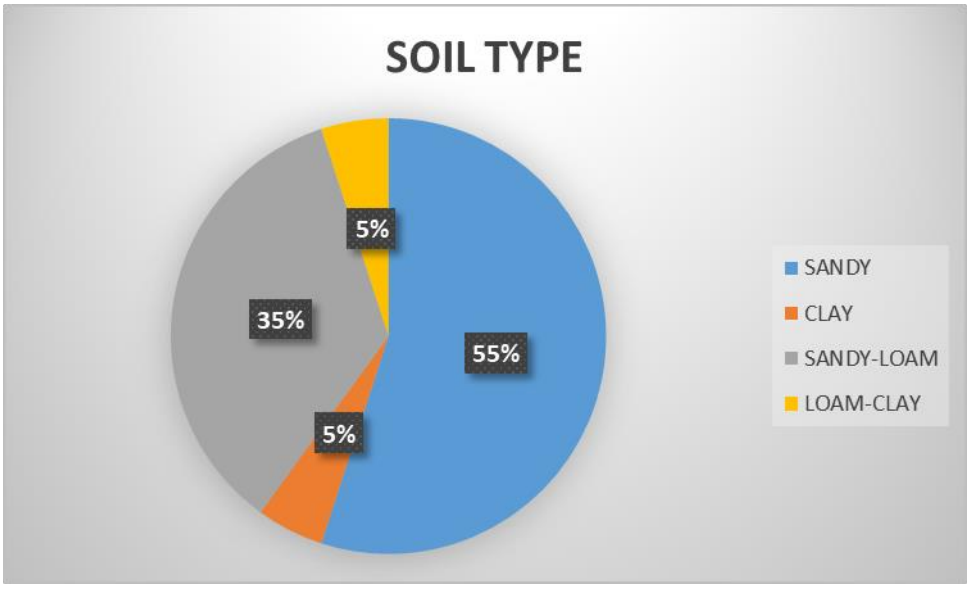

Figure 25 Percentage of different soil types for the previous year cultivated paddy.

The majority of the rice growers interviewed answered that their paddies soil type ranged from sandy (55%) to sandy-loam (35%). A small number, but equally distributed percentage of producers answered that they have clay (5%) to clay-loam (5%) types of soil.

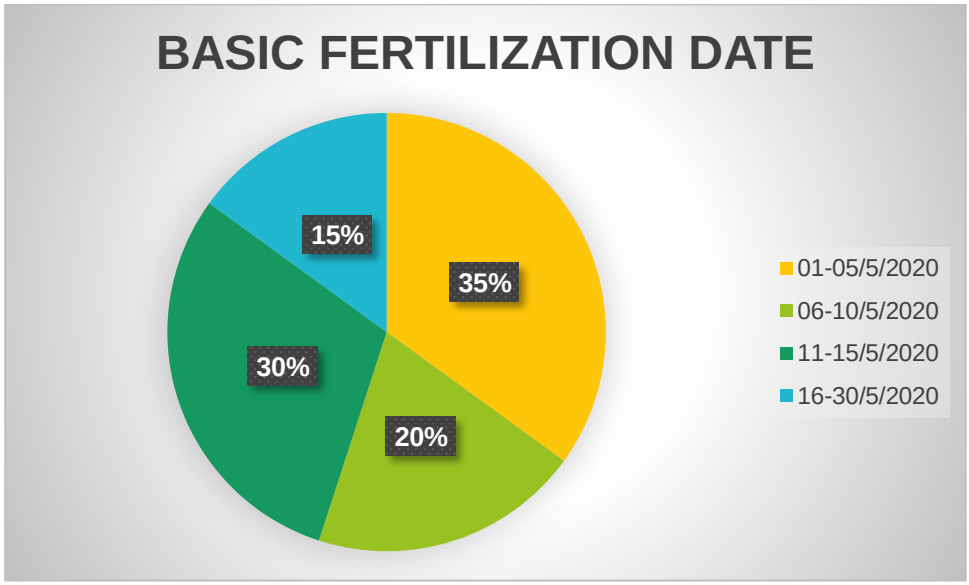

Figure 26 Date distribution for the basic fertilization throughout May of 2020

Most of the rice farmers performed their basic fertilization from the 1st of May until the 5th of May (35%), while another 30% between the 11th of May and the 15th of May. Also, 20% decided to perform their basic fertilization between the 6th of May and the 10th of May, while only 15% between the 16th of May and the 30th of May.

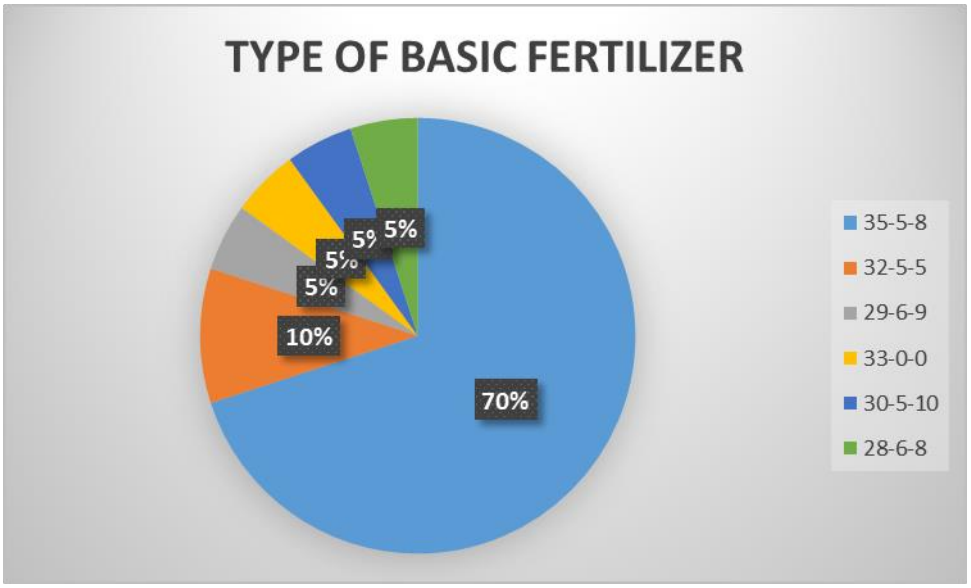

Figure 27 Percentages of the various types of fertilizers used the previous year for basic fertilization.

Most of the questioned participants (70%), when asked about the type of fertilizer that they used for basic fertilization, answered that it was the 35-5-8 type. Another, 10% answered that they used the 32-5-5, while the remaining 20% was equally distributed among four different types of fertilizers (29-6-9, 33-0-0, 30-5-10, 28-6-8).

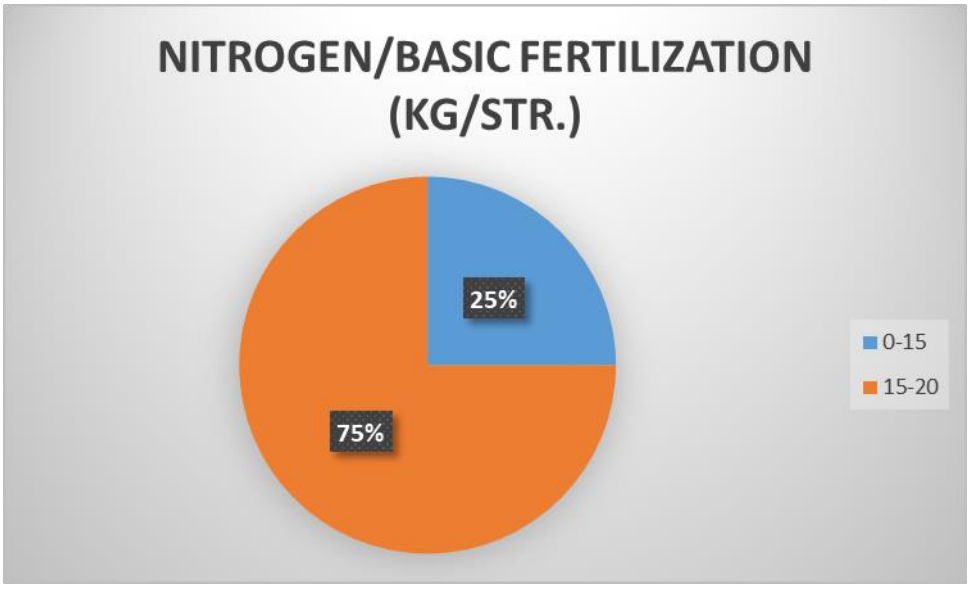

Figure 28 The amount of Nitrogen distributed in the paddies during the application of basic fertilization.

Most of the farmers (75%) applied 15 to 20 kg of nitrogen for basic fertilization per 1000m^2, while 25% of them applied 0 to 15 kg. It is customary for rice growers to apply large amounts of fertilizer during basic fertilization as they believe heavy fertilization at the beginning of the season will help their plants grow faster and more vigorously.

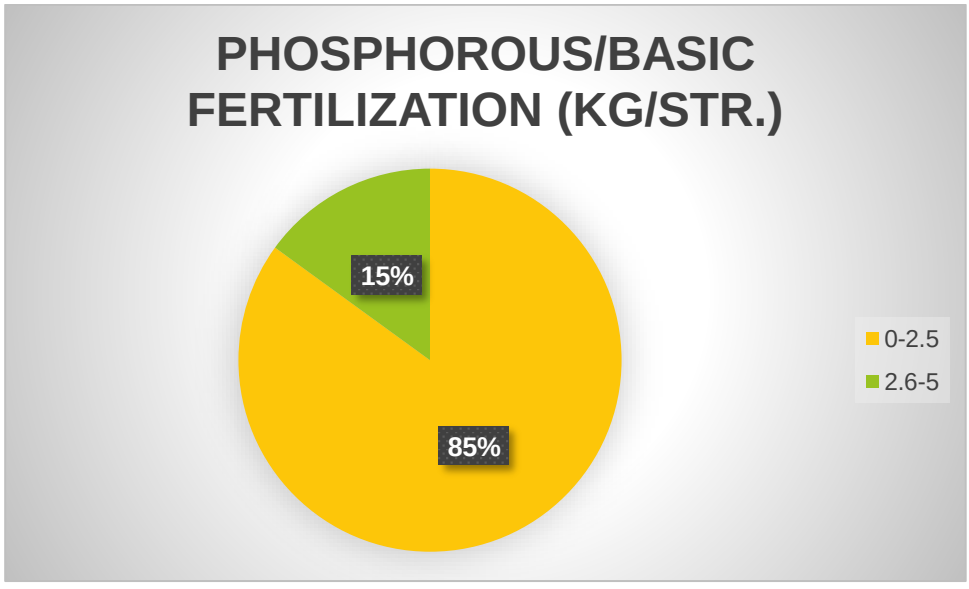

Figure 29 The amount of Phosphorous applied in the fields during basic fertilization

Almost all the rice growers (85%), answered that they applied 0 to 2.5kg of phosphorous and only 15% answered that they applied 2.6 to 5.0 kg per 1000 m^2.

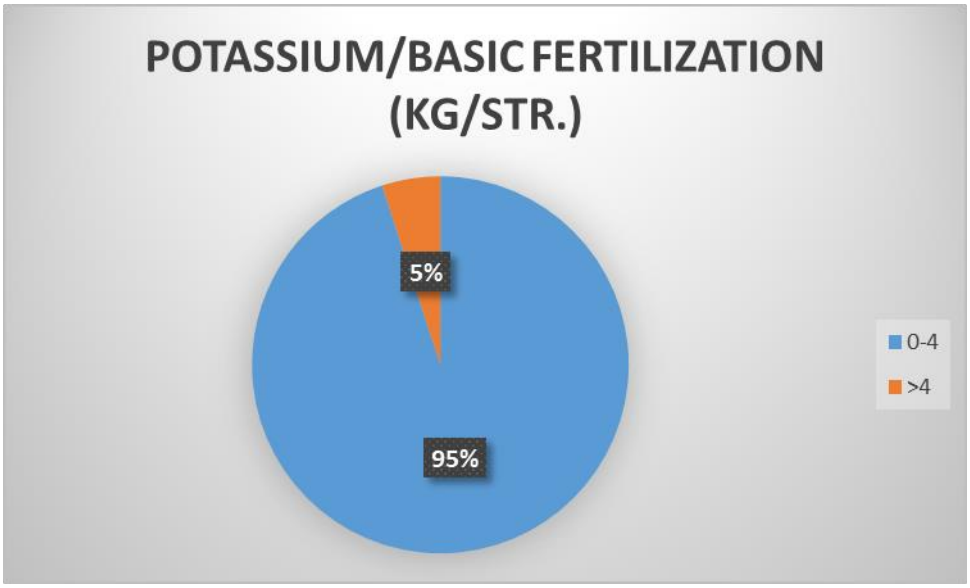

Figure 30 The amount of potassium applied in the fields during basic fertilization.

Most of the participants (95%), when asked about the amount of potassium they applied in their fields, answered that it was 0 to 4 kg per ha, while only 5% applied more than 4 kg/ha.

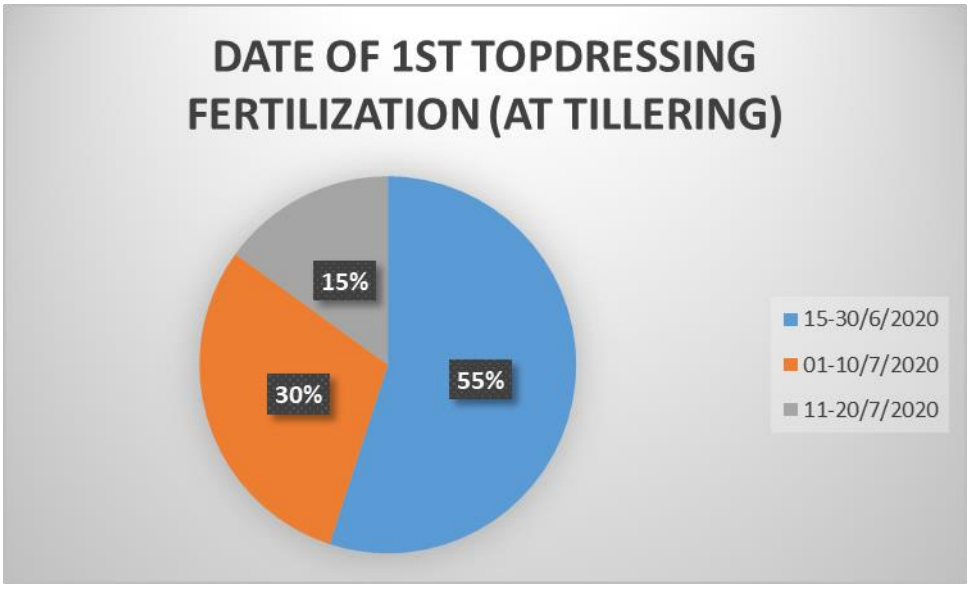

Figure 31 Date distribution for the first fertilization throughout June and July of 2020

Most of the farmers (55%) performed their first top dressing between the 15th and the 30th of June. Another 30% between the 1st and the 10th of July and finally, only 15% performed their first top dressing fertilization after the 11th of July. This is to be expected since according to the strict regimen rice producers follow in Greece, all cultivation practices and agrochemical applications must cease within 50 to 60 days after sowing.

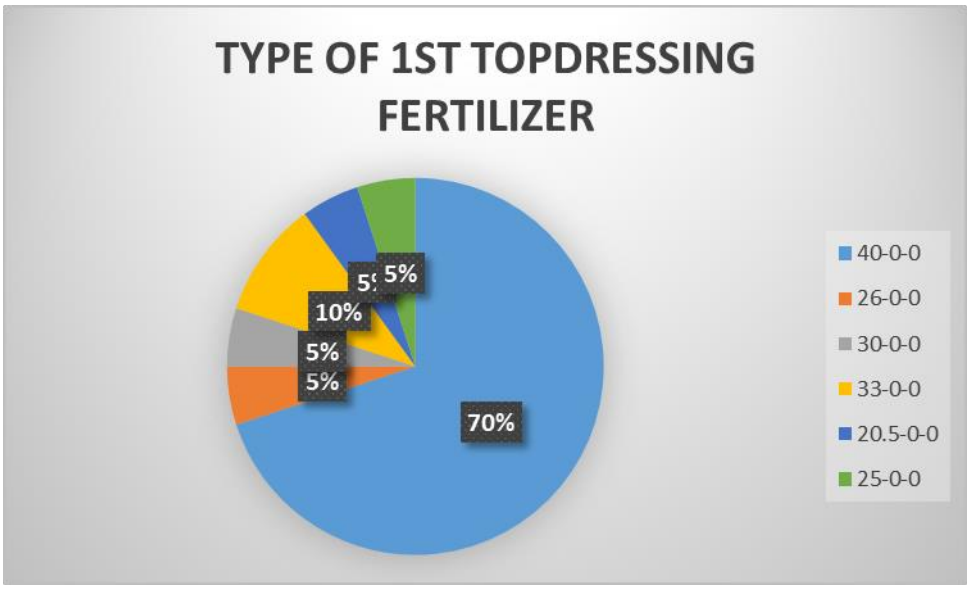

Figure 32 Percentages of the various types of fertilizers used the previous year for the first top dressing fertilization.

Most of the rice growers (70%) answered that they used the 40-0-0 type of fertilizer for their first top dressing fertilization, 10% the 33-0-0, while the remaining 20% was equally distributed among four different types of fertilizer (26-0-0, 30-0-0, 20.5-0-0, 25-0-0).

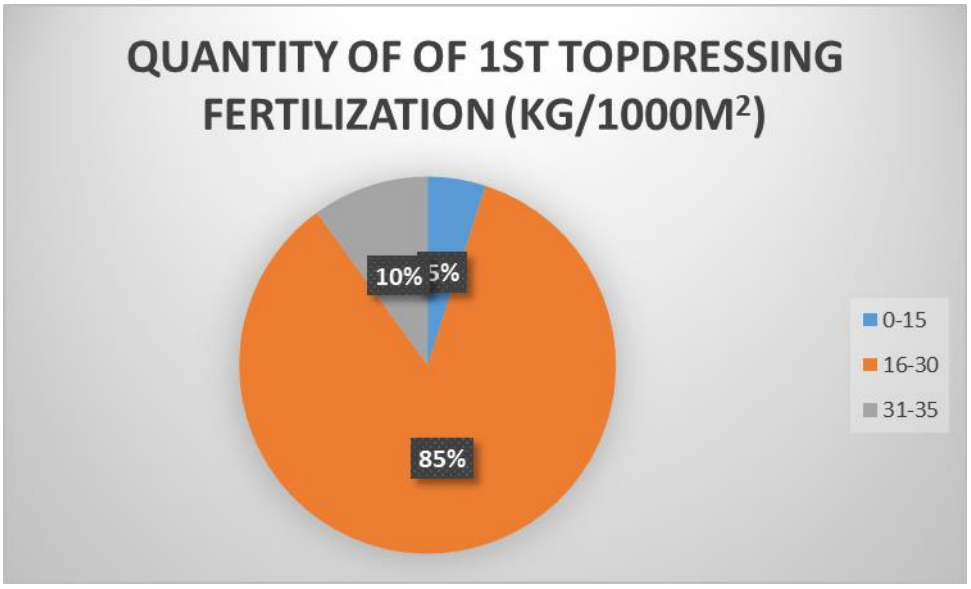

Figure 33 Quantity of fertilizer used during the first fertilization per 1000 m^2

Almost all rice growers interviewed (85%) answered that they used 16 to 30kg of fertilizer per 1000 m^2, while 10% answered that they applied 31 to 35kg. Finally, only 5% answered that they used less than 15kg/1000 m^2. The last year sit is a trend, rice growers perform only one topdressing fertilization.

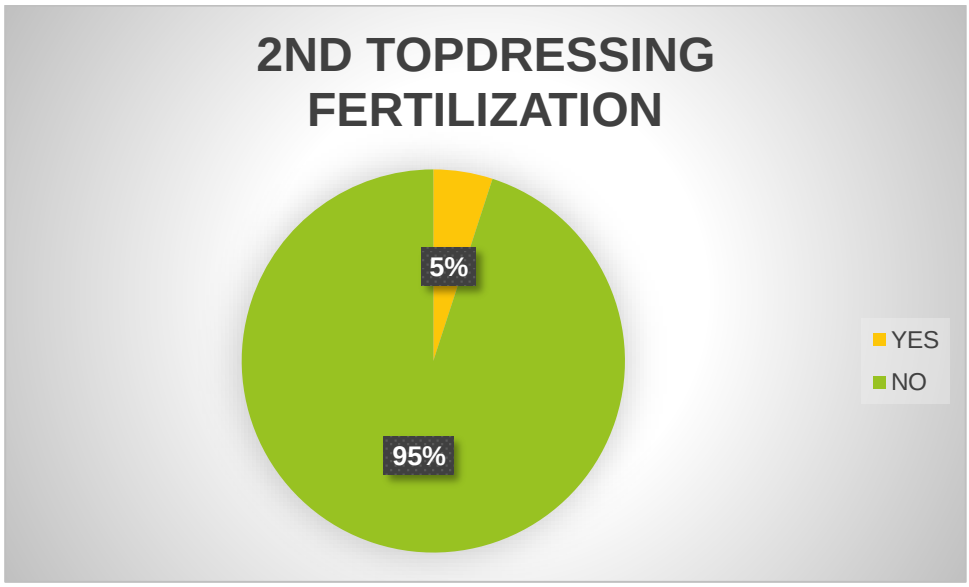

Figure 34 In this figure we can see the percentage of the farmers who performed a second top dressing fertilization

Almost all of the participants (95%), answered that they did not perform second topdressing fertilization and only 5% answered that they did. This is to be expected since, according to the farmers, applying fertilization for a second time after basic is both costly and time-consuming.

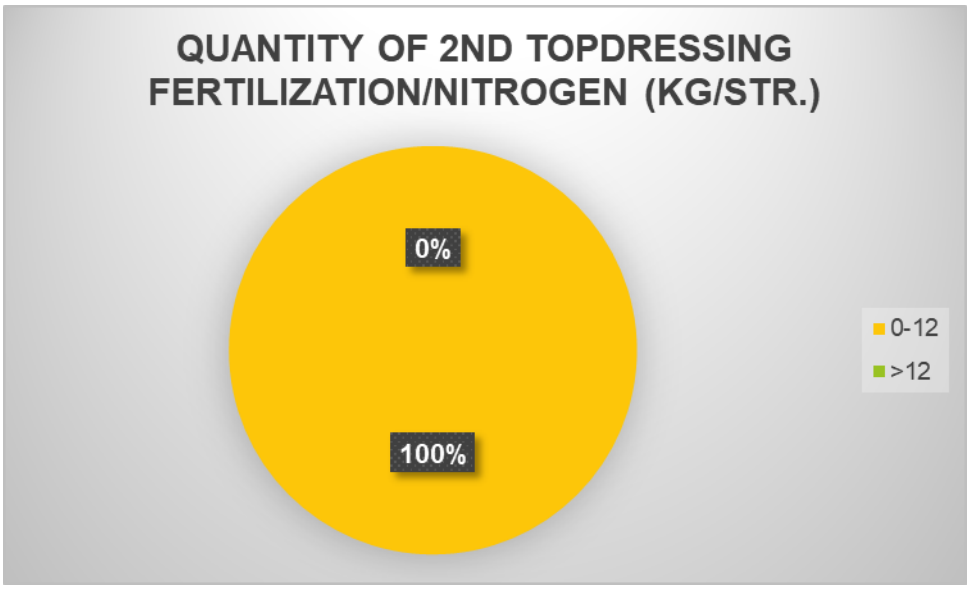

Figure 35 The amount of fertilization used in the second top dressing fertilization.

The remaining 5% that performed a 2nd top-dressing fertilization, answered that they applied only nitrogen and all of them (100%) applied 0 to 12kg/1000 m^2.

Figure 36 Percentage of farmers who have some sort of certification.

Most of the interviewed rice growers (60%) had no quality certification, while 40% had AGRO certification. However, none of the producers were certified for ORGANIC rice farming.

Ongoing and future work through the questionnaire

The second stage of the questionnaire can not be completed by the rice farmers. DEMETER collected grain samples, which were delivered to Chalastra A, concerning the nutritional and quality characteristics. Currently, these samples are undergoing laboratory analysis by DEMETER or some procedure could be performed at CERTH. The data will be provided through the blockchain and will be available to the end-users through the packaging and the QR code.

7. Secondary production questionnaire analysis

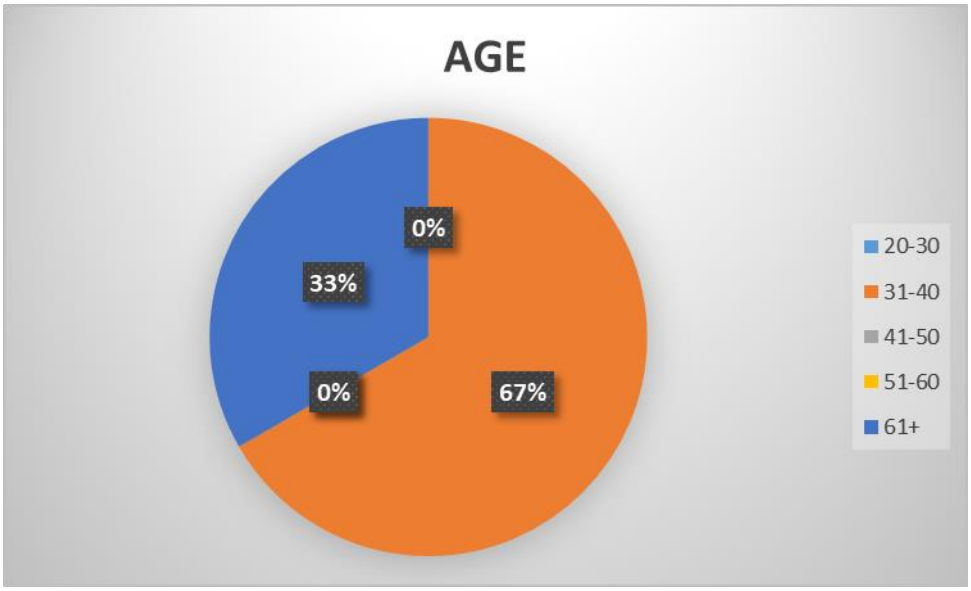

Figure 37 Age distribution among the participants

The majority of the participants interviewed (67%) were relatively young adults with their age varying from 31 to 40 years old, while the remaining 33% was comprised of old people close to retirement (aged 61 and over). On the other hand, there were no participants either young (aged 20 to 30) or middle aged (51 to 60 years old).

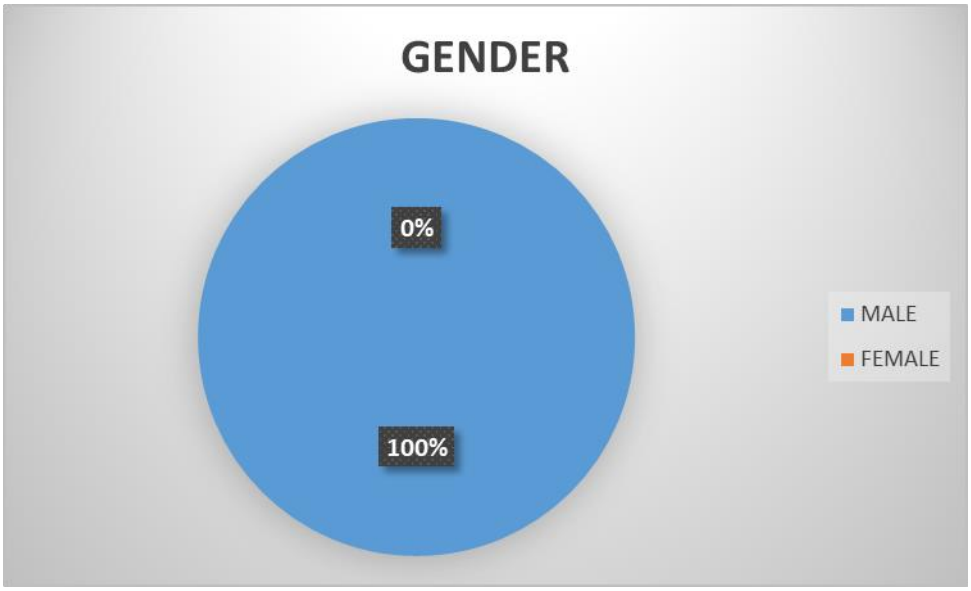

Figure 38 gender distribution among the participants

All the participants were men (100%).

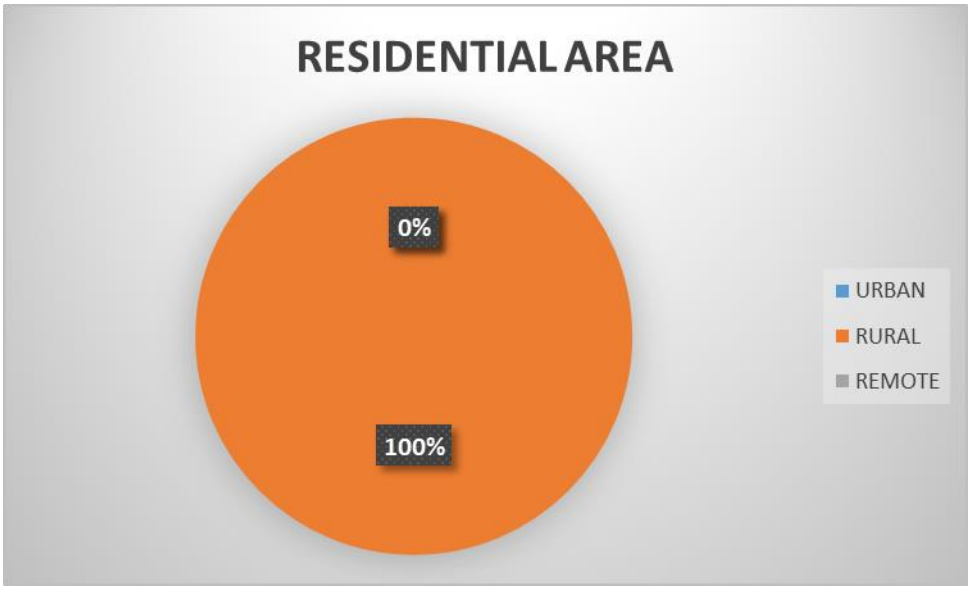

Figure 39 residential area distribution among the participating SMEs

All participants resided in a rural area (100%). This also, is normal as most of their suppliers and most of their clients reside in the same areas. Also, most of the secondary production actors are coming from families associated with the agricultural sector (e.g., farmers).

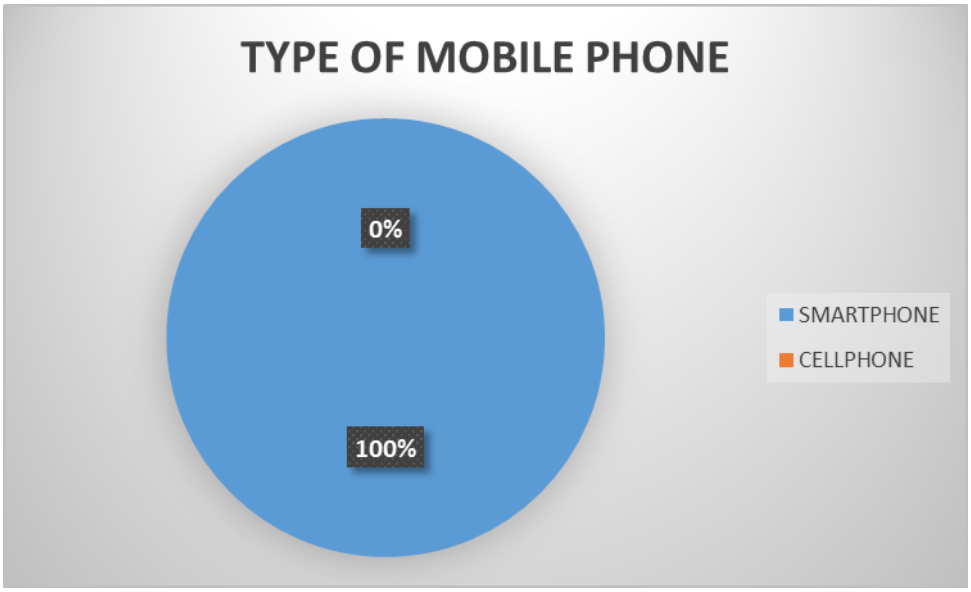

Figure 40 Percentage of smartphone vs cellphone ownership and usage among participants

All the participants (100%) had in their possession and knew how to operate a smartphone.

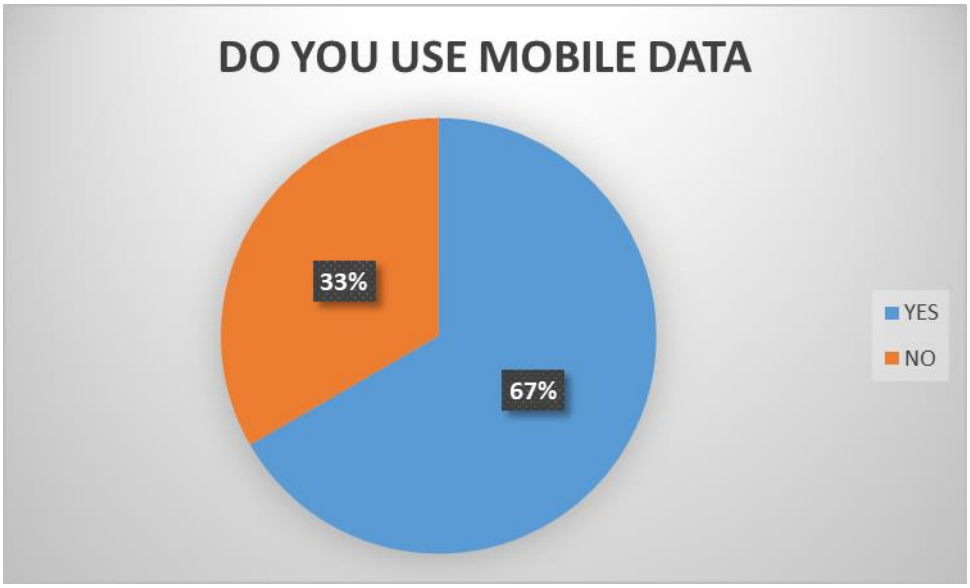

Figure 41 Percentage of SMEs using mobile data for their day to day affairs

Almost seventy percent (67%) of the participants used mobile data in their daily affairs, while almost thirty percent (33%) did not use mobile data.

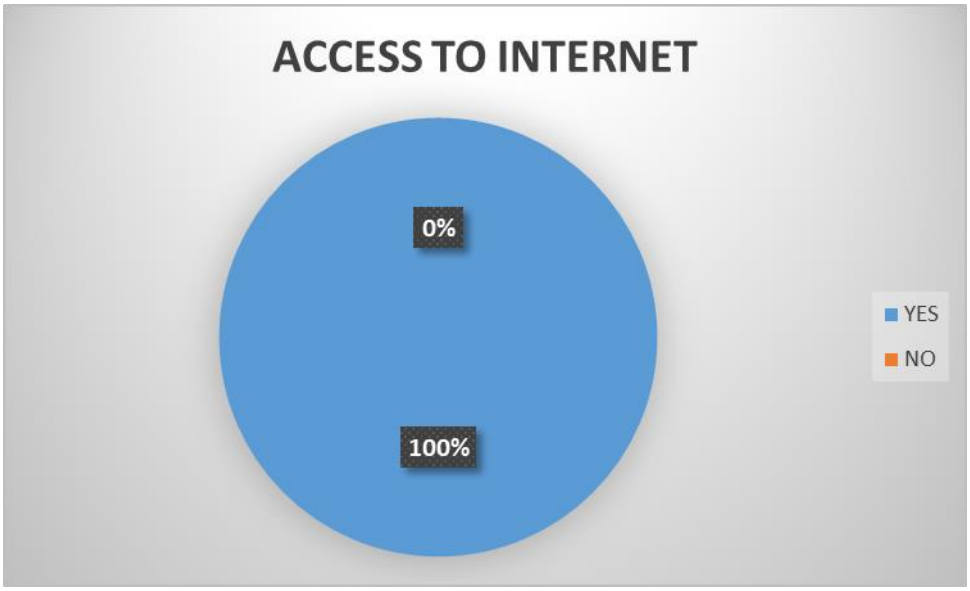

Figure 42 Percentage of participants with access to the internet

All the SMEs (100%) had access to internet.

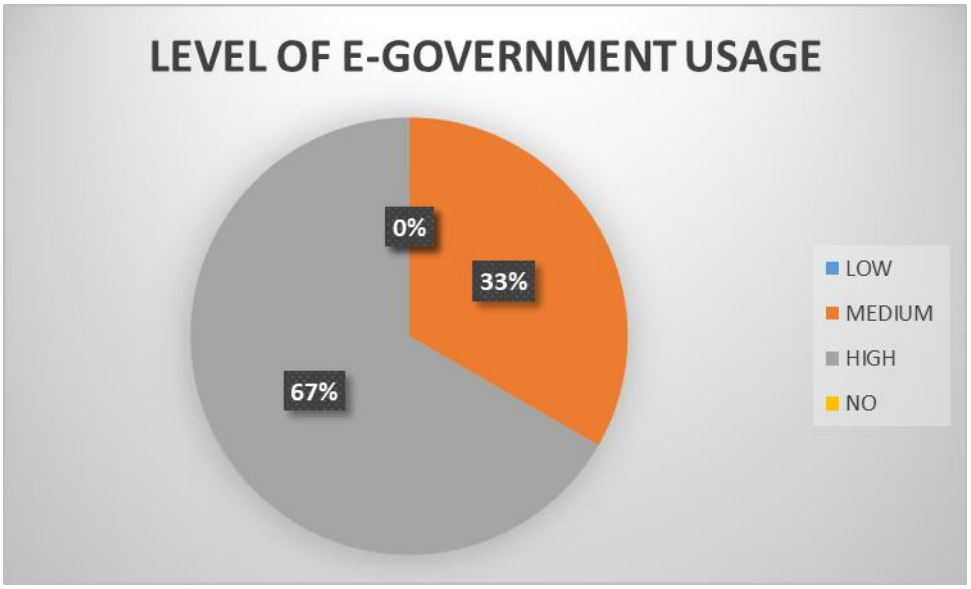

Figure 43 The level of e-government usage by the SMEs

All participants claimed medium to high level of e-government usage. In particular, the majority of the questioned SMEs (67%) claimed a high level of use and understanding of the e-government services, while 33% claimed a medium level of use.

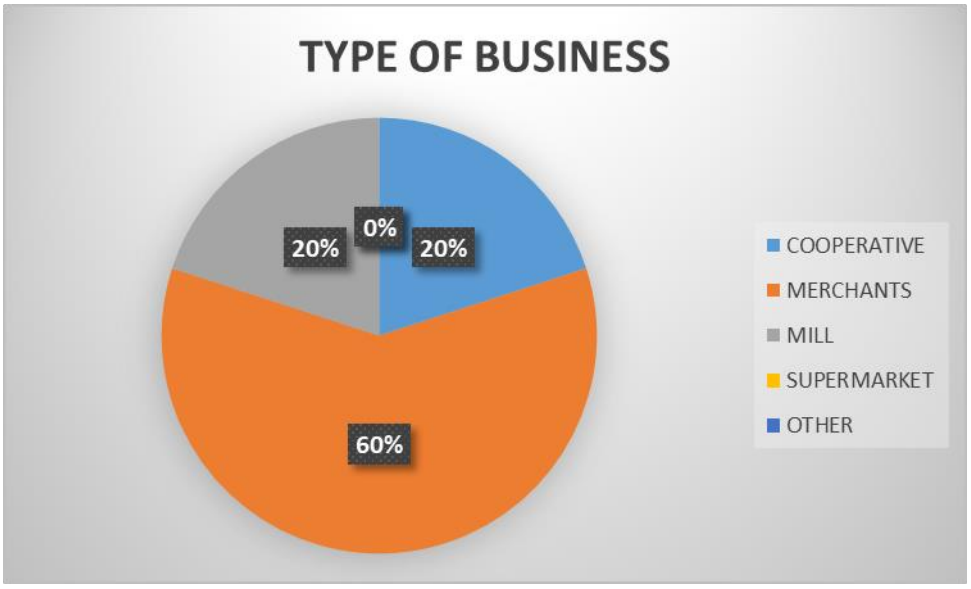

Figure 44 Distribution of the SMEs commercial activity

Most of the participants (60%) claimed that they are merchants, involved in buying and selling agricultural goods, while the remaining 40% was divided equally among cooperatives (20%) and mills (20%).

Next question was whether the SMEs had either ISO or HACCP certification. In this question, all participants (100%) answered that they have both ISO and HACCP certification.

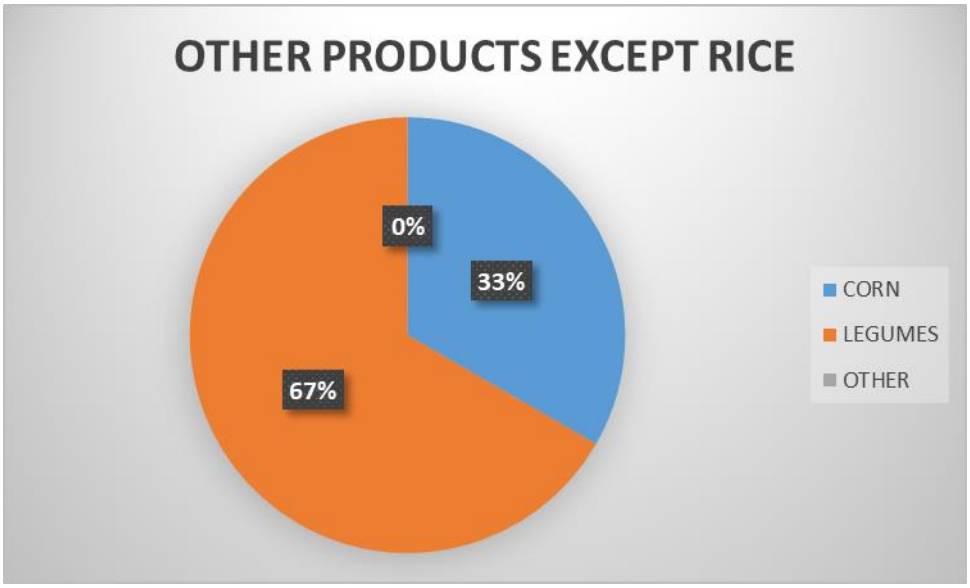

Figure 45 Other products the participants are working with

All of the interviewed SMEs work with rice and either legumes or corn. In particular, most of them (67%) handle only legumes except from rice, while 33% answered that they work only with corn and rice.

Next question was whether the SMEs make sure that none of their purchased products are susceptible to things like fraud, forgery, dilution, substitution, concealment, improper certification, or acquisition via the gray market. In response, all the participants (100%) answered that all products are monitored and are not associated with any of the aforementioned illegal activities.

Another question was whether their products are free from allergens such as, nuts, walnuts, sesame, lupine, soybeans, lactose, eggs, other cereals, fish/shells/clams, sulfites. All of them (100%), answered that their products are totally allergen free, either because they implement regular and rigorous checks and inspections or because they don't handle products with allergens.

Figure 46 The participants answered whether they have to file special HACCP reports

All participants (100%) answered that they have to file special HACCP reports regularly.

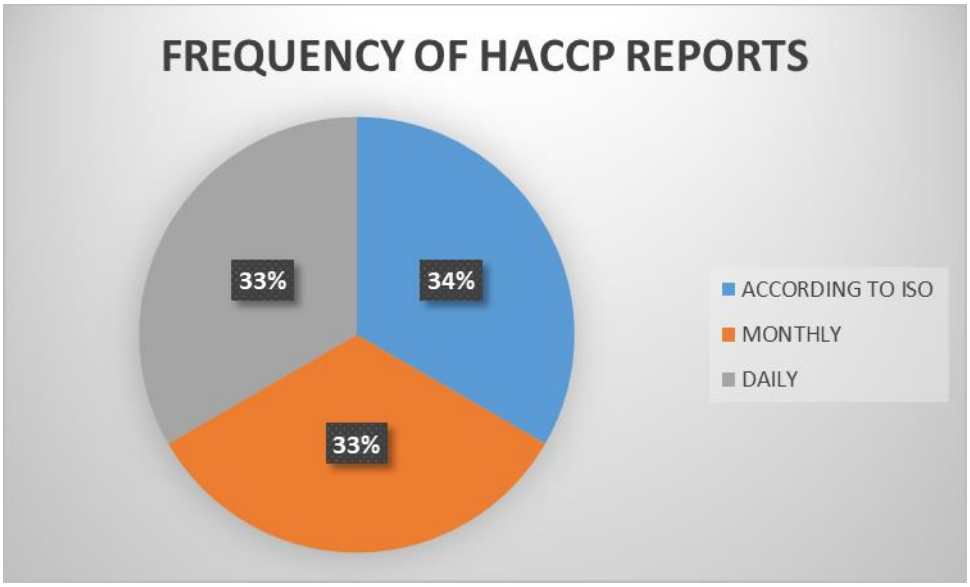

Figure 47 Frequency with which HACCP reports are issued

The results for this question were spread almost equally among three answers. In particular, almost one third answered that they file HACCP reports daily (33%), close to one third answered monthly (33%), while a slightly larger percentage answered according to HACCP rules and regulations (34%).

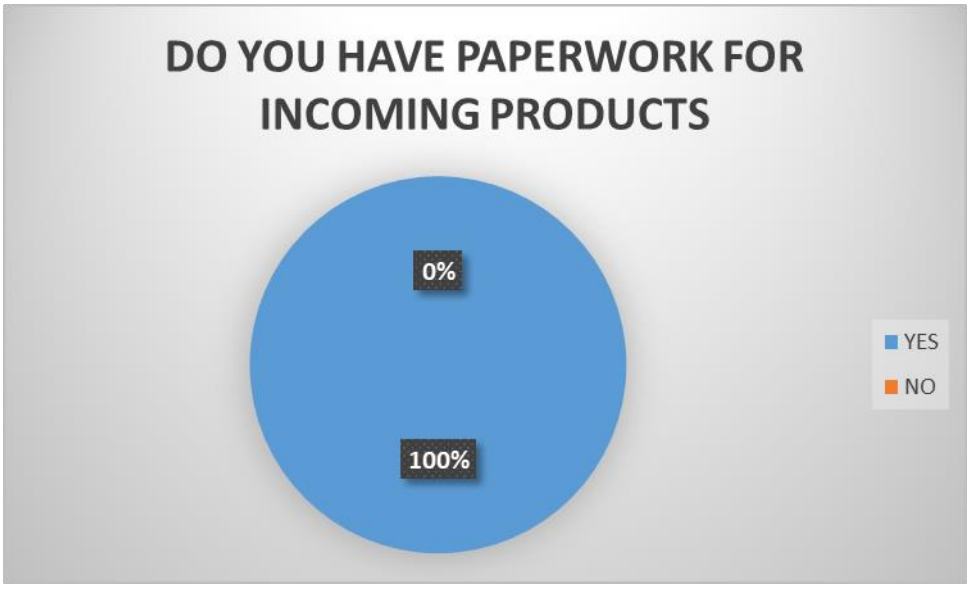

Figure 48 The SMEs answered whether they have to fill special paperwork every time a new product is acquired

All SMEs (100%) answered that they have to fill special forms for all incoming products.

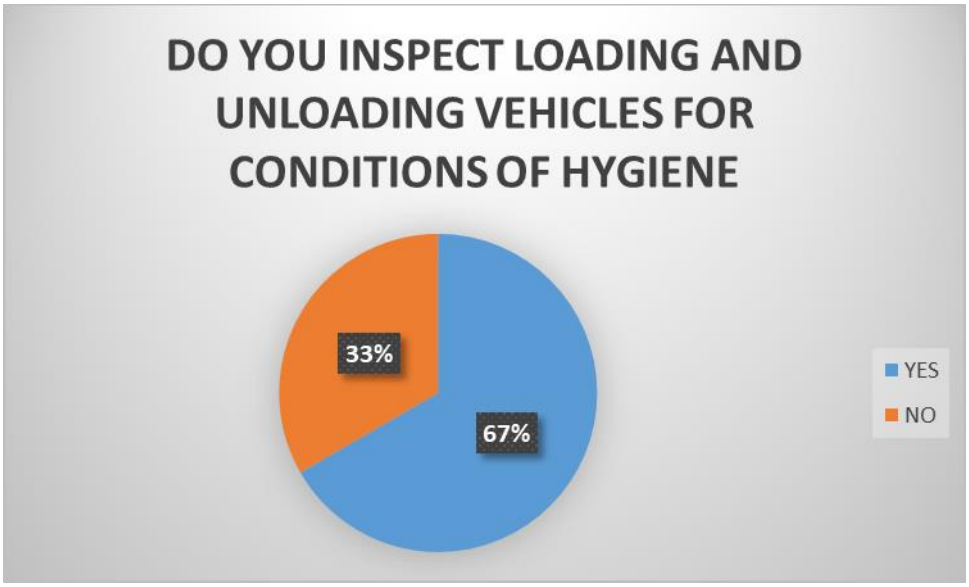

Figure 49 Percentage of SMEs practicing inspections to loading and unloading vehicles for conditions of hygiene.

The majority of the participants (67%) answered that they always perform inspections to loading and unloading vehicles for monitoring the conditions of hygiene, while a smaller but significant percentage (33%) answered that they don't perform any form of inspections to incoming and outgoing vehicles.

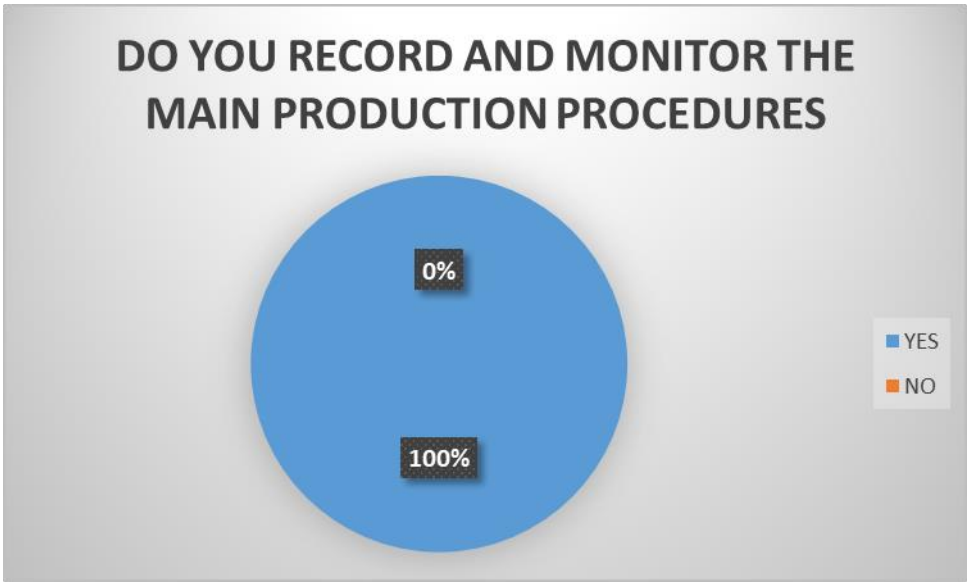

Figure 50 Percentage of the participants who monitor and maintain a record of the main production procedures.

All SMEs (100%) answered that they record and monitor all the main procedures of production.

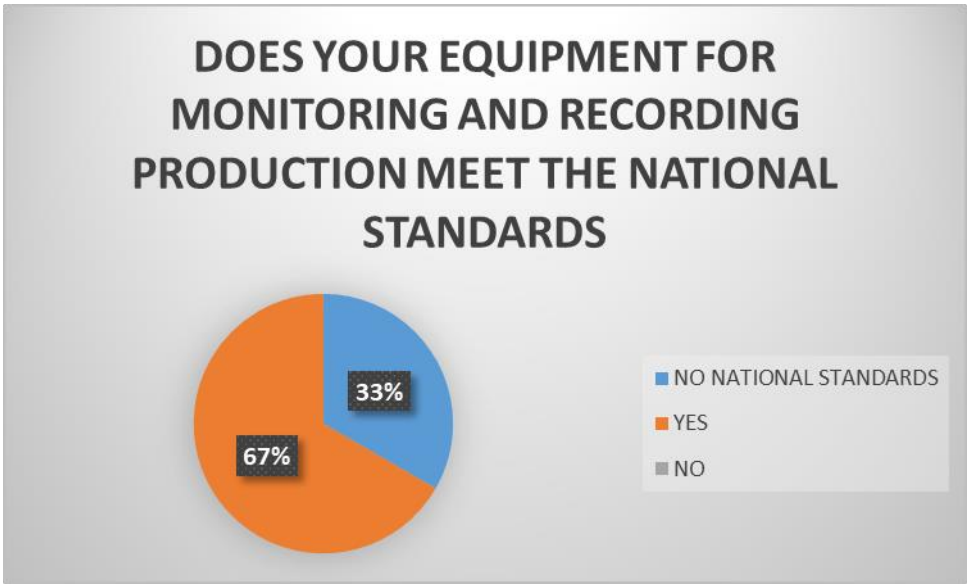

Figure 51 Percentage of participants who own equipment for monitoring and recording production that follow the national legislation.

The majority of the SMEs answered that their equipment for monitoring and recording their production procedures meet the national standards, while surprisingly 33% claim that there are no national standards.

Figure 52 Percentage of participants that use special packaging for transporting their products.

All SMEs (100%) answered that they use special packaging to protect their products and prevent them from spoiling during transport.

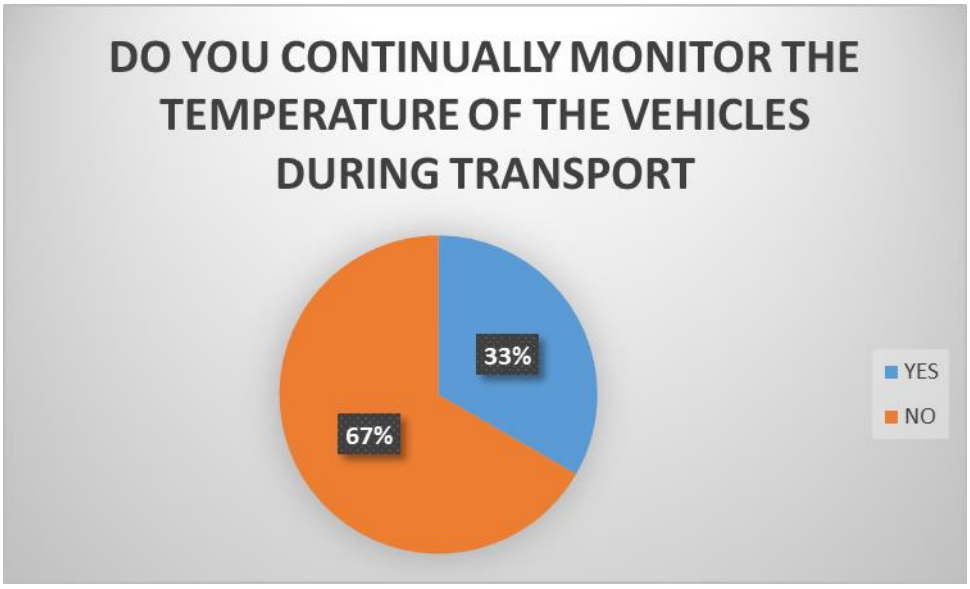

Figure 53 Percentage of SMEs that continually monitor the temperature of their vehicles during transport.

The majority of the participants (67%) answered that they continually monitor the temperature of their vehicles during transport, while 33% answered that they don't.

Figure 54 The participants answered whether they make sure that none of their products comes in contact with allergens.

All SMEs (100%) answered that they don't have to monitor their products for contamination from allergens, since they don't handle such products.

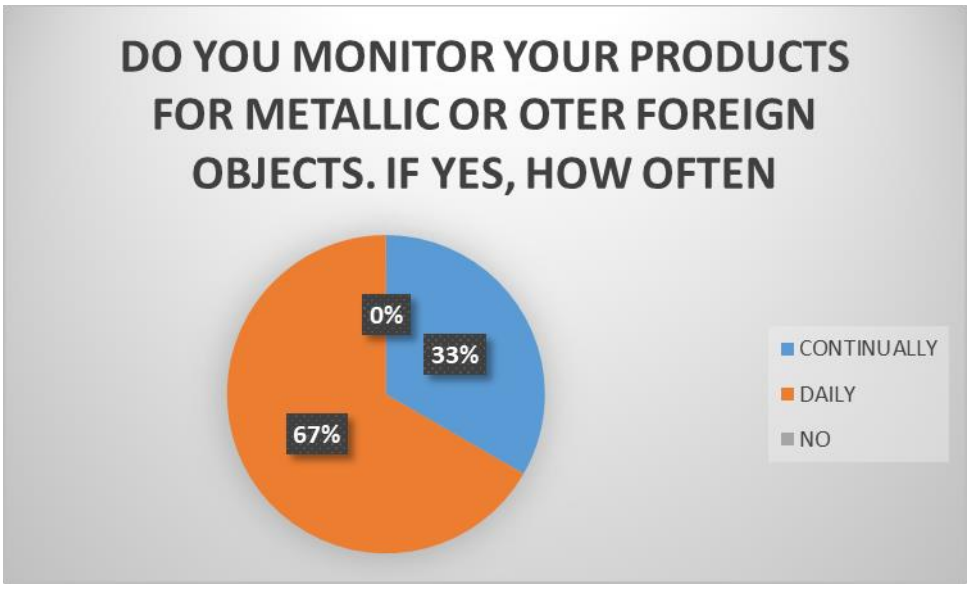

Figure 55 This figure shows the percentage and frequency with which the SMEs check their products for foreign objects

All participants answered that they monitor their products for metallic or foreign objects. However, 67% monitor their products daily, while only 33% check them continually.

Figure 56 Percentage of SME's who make sure that their products are GMO free.

All participants answered that their products are GMO free. In particular, the majority of SMEs (67%) answered that they make sure that their products are GMO free, while 33% answered that they don't have to because they don't handle GMO products.

Figure 57 In this figure we can see the percentage of participants who claim that they have a certified program for disinfestation.

All participants (100%) answered that they have a certified program for disinfestation. This is to be expected, as it is obligatory by law.

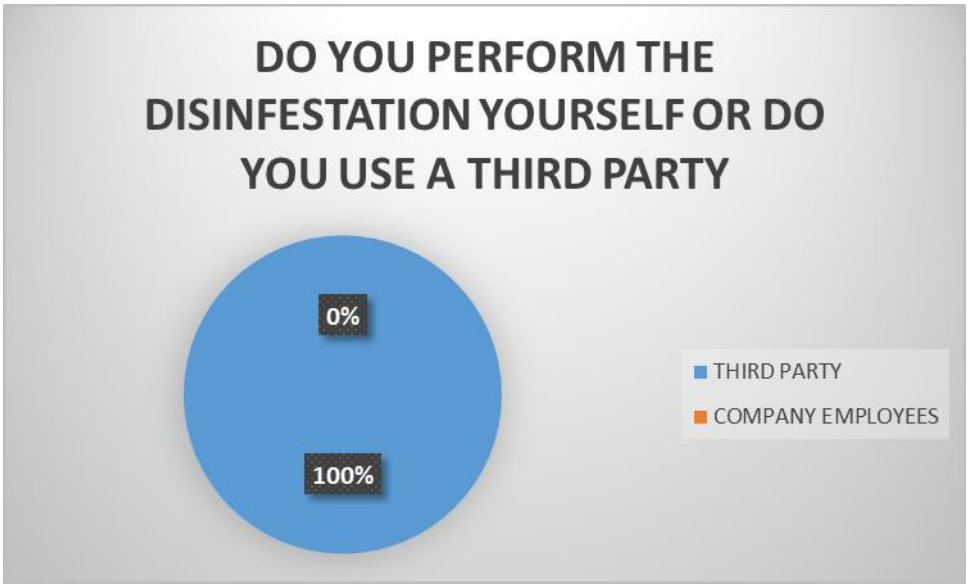

Figure 58 Percentage of participants who perform their own disinfestation and those who use a third party

All SMEs (100%) answered that they use a third party to disinfest their company.

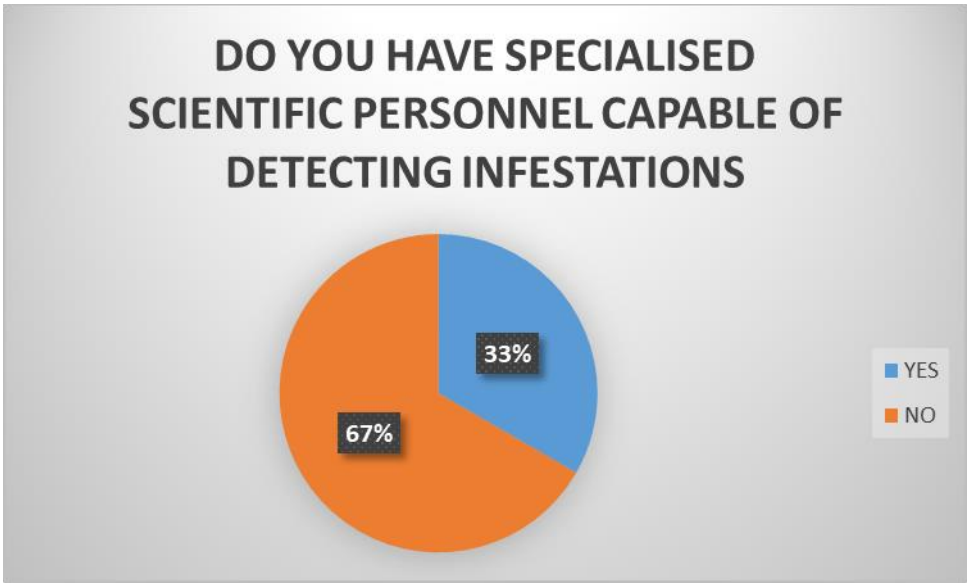

Figure 59 Percentage of participants who employ a scientist capable of detecting infestations.

Most of the questioned SMEs (67%) answered that they do not employ a specialized science capable of detecting infestations and they do it themselves via visual inspection. However, 33% of the participants answered that they have such personnel present in their company.

Figure 60 In this figure the SMEs answered whether they employ a safety technician in their company.

Most of the interviewed participants (67%) answered that they employ a safety technician, while a lower but significant 33% answered that they don't.

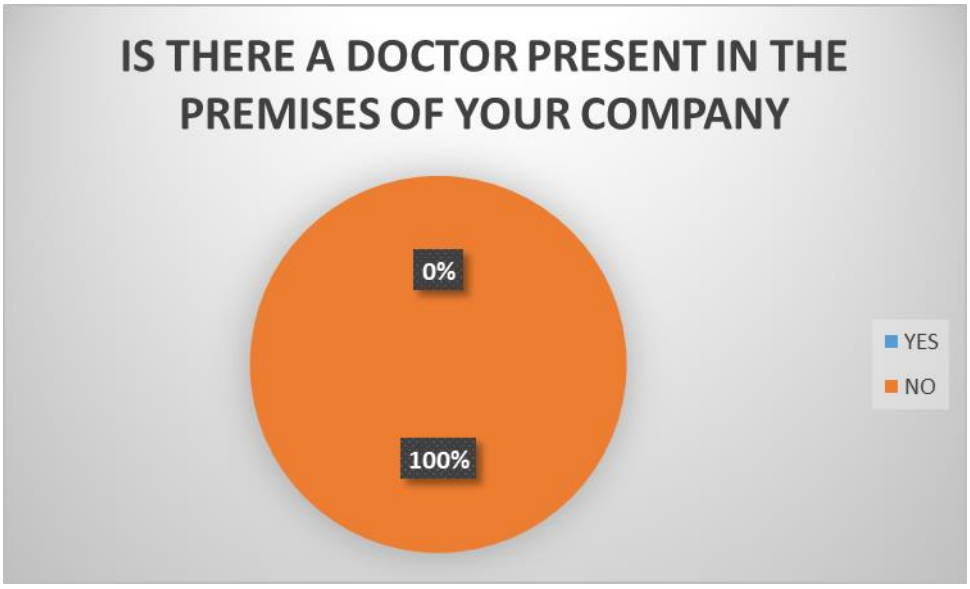

Figure 61 Percentage of companies with a doctor present in their facilities.

All SMEs (100%) answered negatively when asked whether they had a doctor present in the premises of their company.

Figure 62 In this figure the participants answered whether they own and maintain a record of the cleaning schedule and the conditions of hygiene in their company.

The majority of the participants (67%) answered that they have and maintain a record of the cleaning schedule and the conditions of hygiene in their company. On the other hand, 33% answered that they don't have such a record although they clean and check the conditions of hygiene in their company regularly.

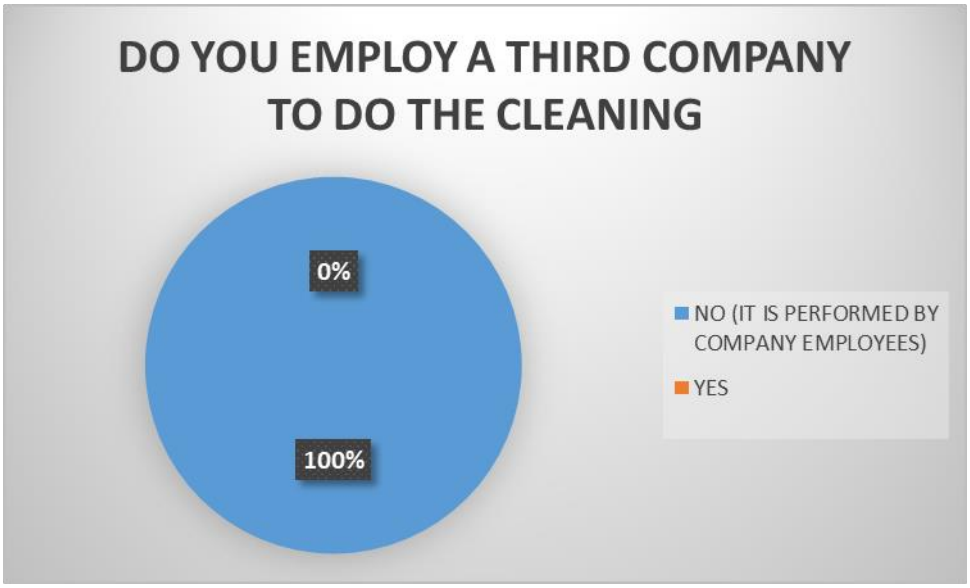

Figure 63 Percentage of SMEs employing a third party to do the cleaning in their company.

All of the participants (100%) answered that the cleaning processes are performed by their own personnel, and they don't employ a third party.

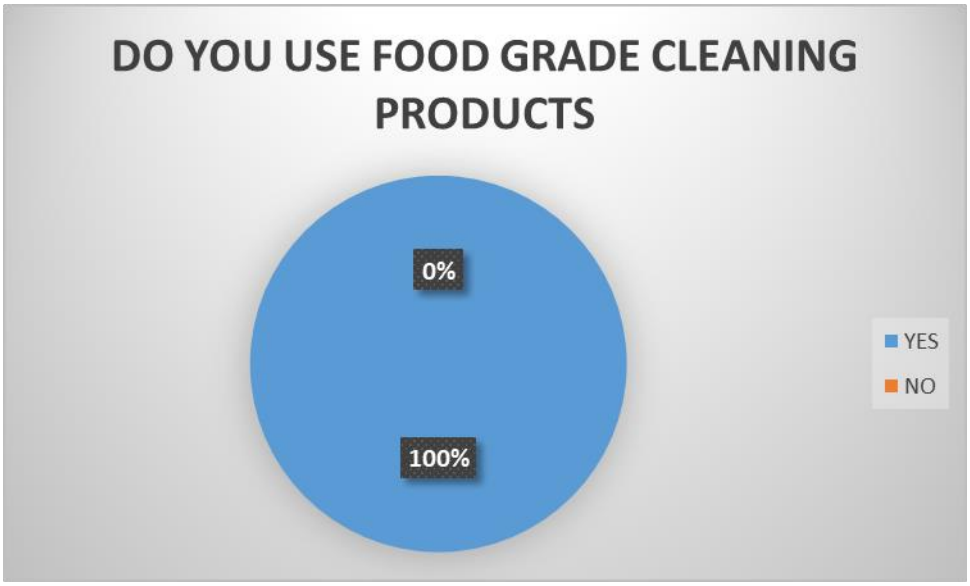

Figure 64 Percentage of companies using food grade cleaning products.

All SMEs (100%) answered that they use food grade cleaning/agents products in their company.

Figure 65 Percentage of companies training their employees so as to keep their work areas clean.

According to all SMEs (100%), all of their employees are trained to keep their working areas clean.

Figure 66 In this figure the participants answered whether they keep a record with the type of illnesses their employees have contracted.

When asked if they keep a record of their employees' illnesses, they unanimously (100%) answered negatively.

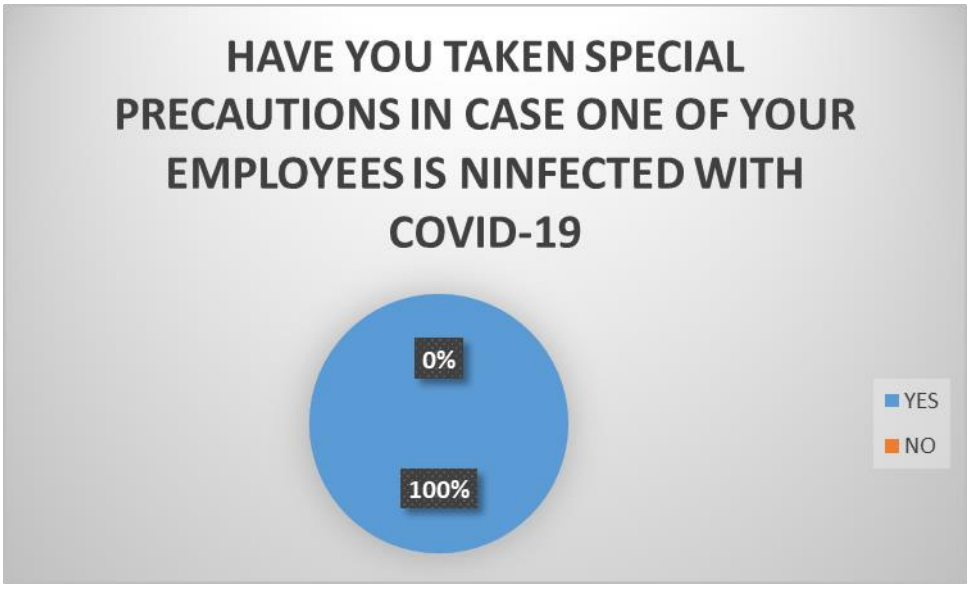

Figure 67 Percentage of SME's who have taken special precautionary measures in case one of their employees is infected with covid disease.

All participants (100%) answered that they have taken special precautionary measures in the case of one of their employees is infected with COVID-19.

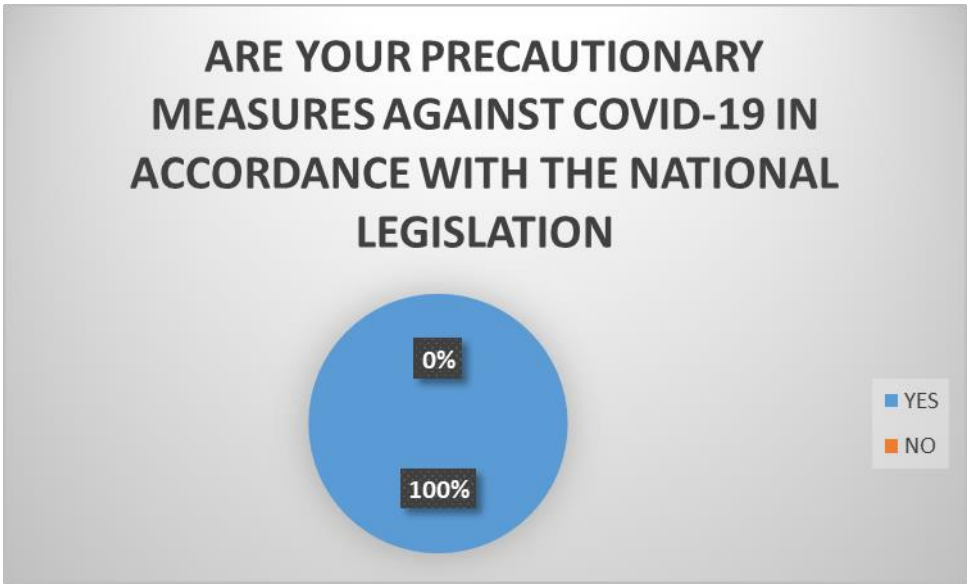

Figure 68 Percentage of participants who have taken measures against covid disease in accordance with national legislation

All SMEs (100%) answered positively when asked whether their precautionary measures against COVID-19 are in accordance with the national legislation.

8. Annex

Click the link to download the annex with the data collection forms