A Research on the Determination of Contributions of Good Agricultural Practices at Citrus Production on Agricultural Enterprises From the Points of Technology and Economy

Oktay SÖYLER[1]* **H.Fatih ATLI[2]**

[1] Iskenderun Technical University, Iskenderun Vocational College, Iskenderun/Turkey

[2] Iskenderun Technical University, Iskenderun Vocational College, Iskenderun/Turkey

*Corresponding Author: oktay.soyler@iste.edu.tr

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Good Agricultural Practices are agricultural production methods which are applied for the goals of: to realise an agricultural production which doesn't harm to the healths of the human beings and animals; the protection of the natural resources; traceability and sustainability in agriculture and the food safety. In our country in recent years good agricultural practices are come out as a production method which is supported by the state at a lot of agricultural activities and is supported by the projects which are applied at different areas. As an example in Hatay, totally 29 producers,18 procuders (in an area of 1011 da) in 2014 and 11 producer (in an area of 540 da) in 2015, are certified by converting to good agricultural practices in the scope of "The Dissemination and Development Project of GAP in Citrus Growing". In this study, in the case of Hatay by applying a field research the technical and economical aspects of this 29 enterprises before and after the certification are determined and evaluated statistically. As a result of the research, it has been determined that the agricultural enterprises that make Good Agricultural Practices have increased their market share compared to the ones before the certification, and that they use the agricultural mechanization tools more consciously, especially the drilling efficiency and economical efficiency in agricultural spraying.

Keywords: Citrus growing, Good Agricultural Practices, Hatay, Technological and economical contributions

Turunçgil Üretiminde İyi Tarım Uygulamalarının Tarımsal İşletmelere Teknolojik ve Ekonomik Açılardan Katkılarının Belirlenmesi Üzerine Bir Araştırma

İyi Tarım Uygulamaları GAP (Good Agricultural Practices); çevre, insan ve hayvan sağılığına zarar vermeyen bir tarımsal üretimin yapılması, doğal kaynakların korunması, tarımda izlenebilirlik ile sürdürebilirlik ve gıda güvenliğinin sağlanması amacıyla yapılan bir tarımsal üretim şeklidir. Ülkemizde İyi Tarım Uygulamaları son yıllarda birçok tarımsal faaliyette devletçe desteklenen bir üretim modeli haline gelmiştir ve farklı yörelerde yapılan projelerle desteklenmektedir. Örneğin Hatay'da "Turunçgil Yetiştiriciliğinde İyi Tarım Uygulamalarının Yaygınlaştırılması ve Geliştirilmesi Projesi" kapsamında 2014 yılında 18 üretici (1011 da alanda) ve 2015 yılında da 11 üretici (540 da alanda) olmak üzere toplam 29 üretici iyi tarım uygulamalarına geçerek sertifikalandırılmıştır. Bu çalışmada, Hatay örneğinde bir alan araştırması yapılarak bu 29 işletmenin sertifikalandırılmadan önceki ve sonraki dönemlerine ait teknik ve ekonomik özellikleri belirlenmiş ve istatistiki olarak değerlendirilmiştir. Araştırma sonucunda, İyi Tarım Uygulamaları yapan tarımsal işletmelerin sertifikalandırılmadan önceki dönemlerine oranla pazar paylarını artırdığı, tarımsal mekanizasyon araçlarını daha bilinçli kullandıkları, özellikle tarımsal ilaçlamalarda ilaçlama etkinliği ve ekonomikliğinin belirgin bir şekilde iyileştiği tespit edilmiştir.

Anahtar Kelimeler: Turunçgil Yetiştiriciliği, Hatay, İyi Tarım Uygulamaları, Teknolojik ve Ekonomik Katkılar

Introduction

With the rapid living entailed by the modern world, the increased income rate level and education level has increased the importance of the consumption of secure food. The consumers have been rendered to be sure of the safety of the food products that they bought whereas the agricultural products that they consumed directly were being at the first place. With this conciousness, the need of the constitution of some systems and standarts for the presentation of the assurance of safe production of direct agricultural products as well as the treated products has been inevitable. In this respect World Trade Organisation (WTO) has constituted a treaty which involves regulations about food safety for

preserving international standarts on "Animal and plant health" at agricultural products exportation. The first one of the Agreement of the Measures on Sanitary and Phytosanitary (SPS Agreement) is on Hazard Analysis Critical Control Points (HACCP) and the other one is "Good Agricultural Practises (GAP). World Food Organisation (FAO) also has worked on the principles of Good Agricultural Practises. Lastly, the big retailers in European Community has constituted the European Retailers Product Work Group (EUREP) and prepared the protocol of the European Retailers Products Work Group Good Agricultural Products about the essentials of good agricultural products on fresh fruits and vegetables at 1999 by coming together.

Good Agricultural Practises has being defined by FAO as "The necessary operations to render the agricultural production system into socially livable, economically profitable and productive, preserving human health, giving importance to animal health and wellbeing and the environment. Thus, the products those were obtained by conforming to good agricultural practises conditions wouldn't contain chemical, microbiological and physical residues which are harmful to human health; produced without contaminating the environment and not disturbing the natural balance, not affected the humans and other living beings during production and produced in accordance with the regulations of the countries in which they were produced and consumed would be warranted by the certificate. Good Agricultural practices involves all the production and marketing stages that goes from the soil to the table. It is a production method that controlled and certificated where all these operations are recorded. With good agricultural products, since the quality at agricultural production, the environment where the agricultural production is made and the wellbeing of the workers in production is noted; The Standards of Work ISO 9001, Quality Management System, ISO14001, Environment Management System and OHSAS 18001, Work Sanitation and Safety Management System are used as well (Anonymus, 2014b).

Considering our country's conditions, on 8th September 2004 with the number 25577 in gazette "Bylaw related to Good Agricultural Practices" in parallel to EurepGAP protocol have been published and effectuated. Later this bylaw was brought up to date and abolished by the new bylaw of "Bylaw on Good Agricultural Practices" which was published on 7th December with the number of 27778.

In table 1 it is seen that there is quite an important production increase in the fields where GAP was applied (Anonymus, 2014a).

In our country the most grown crops produced by Good Agricultural Practices are tomatoes, lemons, oranges, mandarins, apples, grapefruits and olives.

As being a must to offer the fresh fruits and vegetables to the foreign markets, the aim to develop and make widespread, this production method is being backed up governmentally. Nevertheless it is difficult to say that the Good Agricultural Practices has been widespread in the desired Level (Hasdemir, 2011). 55,07% of the producers who have done Good Agricultural Practices said that they have gained more income, whereas 43,48 of them has declared that there was no difference in their income. 68,12% of the producers who haven't done Good Agricultural Practices has declared no difference in their income and 28,99% have an opinion that with these practices there seems more income. 55,07% of the producers who have done Good Agricultural Practices have declared that the marketing chance was high for their products of GAP; 27,54% of them declared marketing state was same as the other products and 10,14 was thinking of that marketing state was limited nowadays but would be better in the future (Sayın et al., 2015).

Table1.The alteration in Good Agricultural Practices statistics in Turkey between 2007-2014.

Years	Number of Provinces	Number of Growers	Productıon Fields(da)	Productıon Quantity(t)
2007	18	651	53.607	149.693
2014	53	21.332	2.147.705	4.151.661
Alteration Rate(%)	194	3177	3906	2673

72,09% of the producers of Tracia Region have stated that they have done Good Agricultural Practices for that they are less harmful to the environment; 69,77% of them for they have got good quality products; 51,16% of them for being controlled at every stage; 34,88% of them for getting support; 27,91% of them for the safety of the workers; 18,60% of them for getting more crop and 2,33% of them for a better marketing facility (Aydın et al., 2015).

It is determined that the ones who did Good Agricultural Practices have more agricultural tools and machines than the ones who didn't it but statistically there was no difference in the meaning of the possession of tools and machines between the groups who did Good Agricultural Practices or didn't. It was determined statistically that the sensitivity of the producers about human health on using agricultural mechanisation facilities who didn't do Good Agricultural Practices were less than who did Good Agricultural Practices (Ekmekçi et al., 2012).

A farmer who has realised Good Agricultural Practices could use the agricultural mechanisation facilities more effectively and productively during his agricultural works. The operators who use agricultural mechanisation facilities are well trained, informed and experienced about the usage of these facilities. On the other hand it may be said that these operators are well informed about safety and well trained about precautions, the existince of risks and the necessity of safety precautions while using agricultural mechanisation facilities. The rising of the sensitiveness of the farmers who do Good Agricultural Practices on human health and safety could be evaluated as another notable result (Çobanoğlu, 2007).

At fresh figs enterprises there were no differences on having agricultural tools and machines between the groups who did Good Agricultural Practices and who didn't do them, but there were statistically a difference about making the periodical calibrations of the tools and machines. Whereas the rate of the ones who did periodical calibrations were 48 % at enterprises who didn't do Good Agricultural Practices, it was 75% at enterprisese who did Good Agricultural Practices (Sayın et al., 2015).

In the coverage of the project on widespreading and developing of Good Agricultural Practices on citrus growing at Hatay Province, the enterprisese of totally 29 producers; in 2014, 18 producers and in 2015, 11 producers, were provided to adopt to the criteria of Good Agricultural Practises and had been certified. The fares of project control firms and certificate firms were paid by the ministry and was started with a source of 150.000 Turkish Liras finance. The expenditures of materials (Gas masks, cupboards, medicine bags, protective clothings, pesticit annilihation units, visuals and trainings) was paid by the project executed by the provincial directorate.

The certification was realised after the production fields that were adopted to the Good Agricultural Practices bylaw and criteria being controlled by Control Certification Corporations. Trainings on "First Aid", "Basic Hygiene"," Good Agricultural Practices"," Orchard Security and Safety Rules" are given to the producers. During controls 100% appropriateness was asked for the major items and 95% appropriateness for the minor items. A correction time of 7 days for the major unsuitiblenesses and 28 days for the minor unsutiblenesses were given. In the given time all the enterprises had confirmed the required conditions. The project had been executed for 3 years and ended at 2016.

Materials and Methods

The research had been executed under the coverage of "The Project of Widespreading and Development of Good Agricultural Practices on Citrus Growing" over the citrus growing enterprises which were certified as applying the good Agricultural Practices in Dortyol Town of Hatay Province. In this respect 18 enterprises which have been included to the project(on 1011 da area) in 2014 and 11 enterprises (on 540 da area) which have been included in 2015 were examined.In these enterprises mandarin and orange production were made as citrus kinds.Some economical and technical properties before and after the application of the Good Agricultural Practises have been determined and compared statistically.Among them there were the properties which have been evaluated were crop amount been got from unit area (t/da), total crop amount (t), total income been got from the sale of crop (TL), total chemical used for the unit area (l/da), usage effectiveness of agricultural chemicals, fertilizer amount used for the unit area (kg/da), fertilizing efficiency, usage effectiveness of agricultural tools and machines, market share and hygiene conditiitions of the enterprises.Datas have been obtained from Dortyol Agriculture and Animal Breeding Directorate official statistics, records of

the Control Certificate Corporation during their controls and face to face talkings with the managers of the enterprises. For the analysis of the data t-test of 95% reliability and variance analyse methods were used.

Results and Discussion

Crop amount from unit area (t/da)

Under the project the averages and standart errors of the crop amounts got from unit area of 18 enterprises which shifted to Good Agricultural Practices in 2012- 2016 are given in table 2.

Alteration rate between 2012 and 2014 was 38,7%, 2014 and 2016 was 18,31%. The averages and standart errors of the crops got from the unit area of 11 enterprises in 2012-2016 which come into the project in 2015 are given in table 3.

Alteration rate between 2014 and 2015 was 2,4%, 2015 and 2016 was 7,31%. According to these data it is seen that the Good Agricultural Practises have no significant contribution on the crop amounts of got from unit area of the enterprises. In figure 1, crop amounts got by the enterprises from the unit area before and after they shifted to Good Agricultural.Practises are shown

Table 2. Averages and standart errors of crop amounts got from unit area by 2014 certified enterprises

	2012	2013	2014	2015	2016
Averages (t/da)	2,48	2,76	3,44	3,64	4,07
Standart Errors(±)	0,20	0,23	0,28	0,30	0,34

Table 3. Averages and standart errors of crop amounts got from unit area by 2015 certified enterprises

	2012	2013	2014	2015	2016
Averages	2,69	2,99	3,74	3,83	4,11
Standart Errors(±)	0,19	0,21	0,26	0,24	0,24

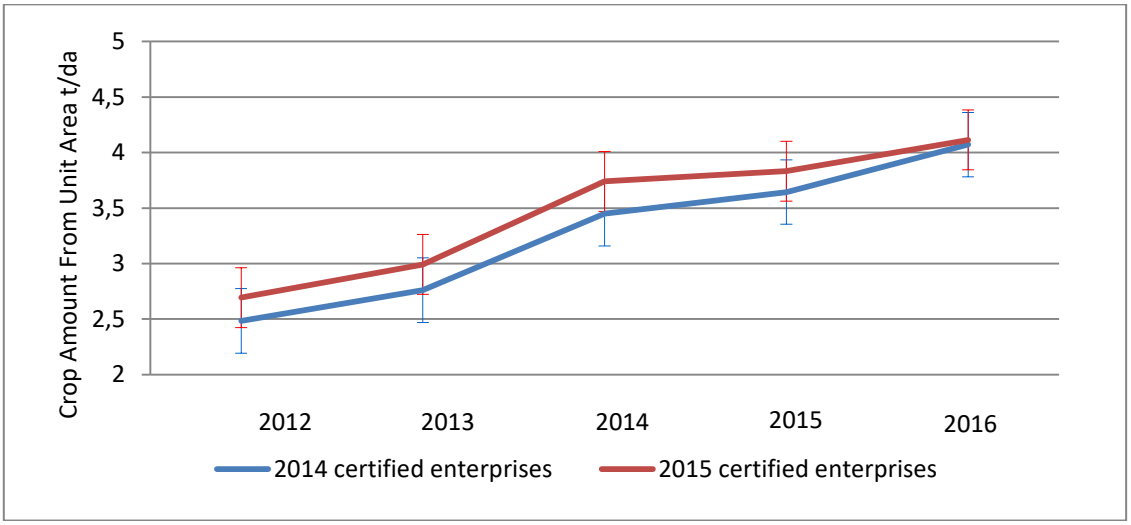

Figure 1.Comparison of the crop amounts gained by the enterprises before and after they had shifted to GAP

Total crop amount (t)

Under this project, the averages and standart errors of the total crop amounts of 18 enterprises which has shifted to Good Agricultural Practices in 2014 are given in table 4 for some years some years. Alteration rate between 2012 and 2014 was 38,88%, 2014 and 2016 was 24,95%. The averages and standart errors of the total crop amounts in some years at 11 enterprises which come into the project in 2015 are given in table 5. Alteration rate between 2014 and 2015 was 3,07%, 2015 and 2016 was 31,13%. In figure 2, total crop amounts of the enterprises before and after shifting to Good Agricultural Practises are seen. According to these values there is an important increase at the values of the enterprises which have shifted to Good Agricultural Practices in 2015, whereas no significant changes at others.

Table 4.The averages and standart errors of total crop amounts at the enterprises certified of 2014

	2012	2013	2014	2015	2016
Averages	116,52	129,47	161,83	170,39	202,22
Standart Errors(±)	24,94	27,71	34,66	36,26	42,93

Table 5. Averages and standart errors of total crop amounts at the enterprises certified of 2015

	2012	2013	2014	2015	2016
Averages	82,78	91,97	115	118,54	155,45
Standart Errors(±)	9,52	10,58	13,22	13,80	28,59

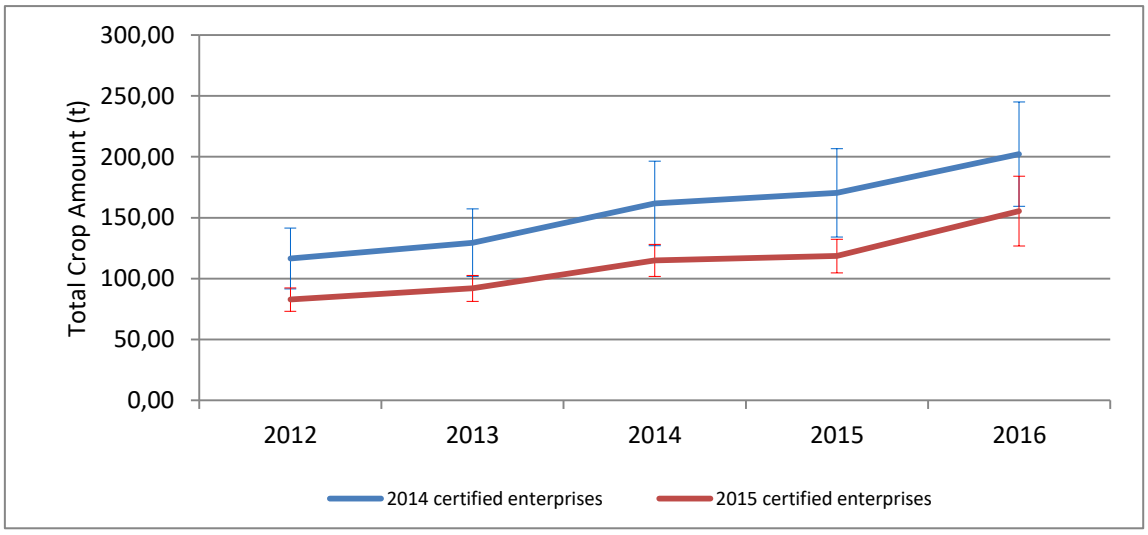

Figure 2.Comparison of the total crop amounts of enterprises before and after shifting to GAP

Table 6. Averages and standart errors of crop sales incomes of 2014 certified

	2012	2013	2014	2015	2016
Averages	34.955,63	45.312,85	72.825	76.675	101.111,1
Standart Errors(±)	7.481,34	9.698,03	15.596,49	16.317,15	21.463,24

Table 7. Averages and standart errors of crop sales incomes 2015 certified enterprises

	2012	2013	2014	2015	2016
Averages	24.834	32.192,23	51.750	53.345,45	77.727,27
Standart Errors(±)	2.857,39	3.704,03	5.952,94	6.210,64	14.295,8

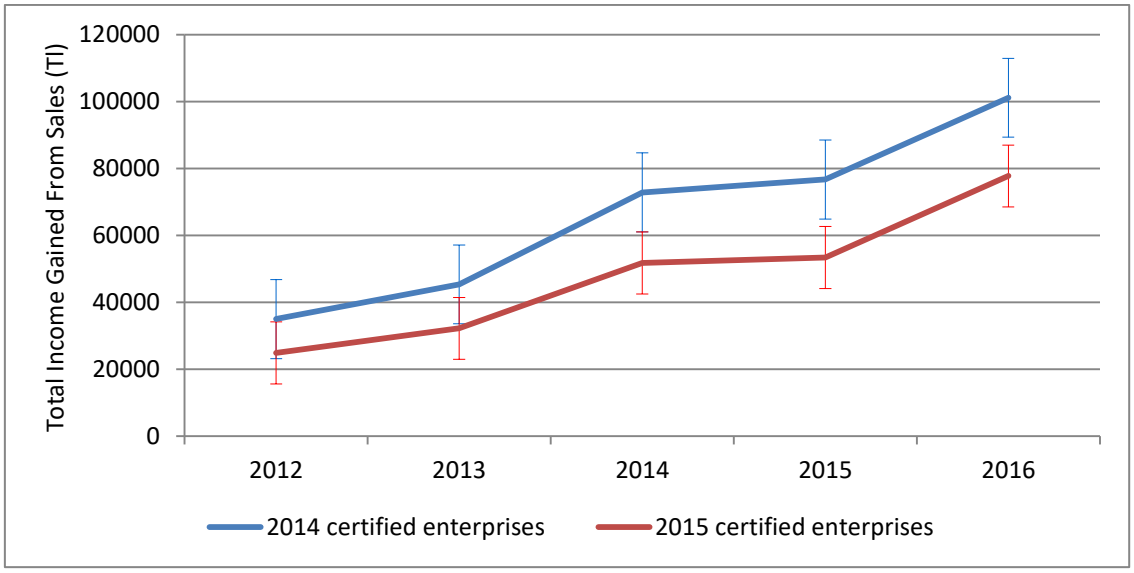

Figure 3. Comparison of crop sales incomes of enterprises before and after shifted to GAP

Total Income Gained from Crop Sales (TL)

Under the project, averages and standart errors of crop sales incomes of 18 enterprises in some years which shifted to Good Agricultural Practices in 2014 are given in table 6. Whereas a profit of 80.000 TL was gained (325 TL/t) from 246 tons crop obtained in the period before 2014 there was a profit of 177.786 TL (477 TL/t) gained from 373 tons crop in the period after 2014. Averages and standart errors of crop sales incomes of 11 enterprises which have shifted to the project in 2015 in some years are given in table 7. Whereas a profit of 108.776 TL (375 TL/t) was gained from 290 tons crop obtained in the period before 2015, a profit of 77.727 TL (501 TL/t) was gained from 155 tons crop in the period after 2015. In figure 3, crop sales incomes of the enterprises before and after they have shifted to Good Agricultural Practices are seen. The product unit sales prices of 18 enterprises come into the project in 2014 have increased 46,76% compared to the previous period whereas the product unit sales prices of 11 enterprises come into the project in 2015 have increased 33,60%.

Chemicals quantity sprayed to unit area (l/da)

The amount of chemicals sprayed by 18 enterprises shifted to Good Agricultural Practises, the average quantities before 2014 was founded as 1,98 l/da and 1.81 l/da after 2014.The amount of decrease was fixed as 0,18 l/da on an average (%9,09). Similarly the average values of the sprayed chemicals quantities sprayed by 11 enterprises shifted to Good Agricultural Practices were founded as 2,03 l/da before 2015 and 1,71 l/da after 2015.The amount of decrease was fixed as 0,33 l/da (16,25%). The difference was found as important statistically for 2 periods averages at both evaluations (95% safety interval, t-test MS Excel). It was fixed that although the amounts of the chemicals sprayed to the unit area by all the 29 enterprises shifted to Good Agricultural Practises have been decreased, the effectivenesses of agricultural chemicals usage have increased at 19 of the enterprises.

Amount of fertilizers used (kg/da)

The average values of fertilizers used per unit area by 18 enterprises shifted to Good Agricultural Practices in 2014 were found as 51,94 kg/da before 2014 and 47,77 kg/da after 2014.The amount of decrease was fixed as 4,17 kg/da (8,02%). Similarly the average values of the fertilizer quantities used by 11 enterprises shifted to Good Agricultural Practises were found as 50,90 kg/da before 2015 and 45,90 after 2015.

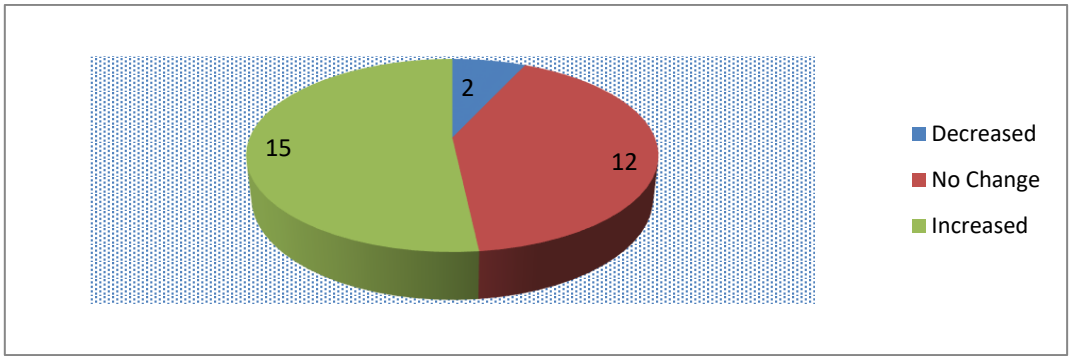

Figure 4. Diagram showing how usage effectiveness of agricultural tools and machines changed for 29 enterprises after shifting GAP

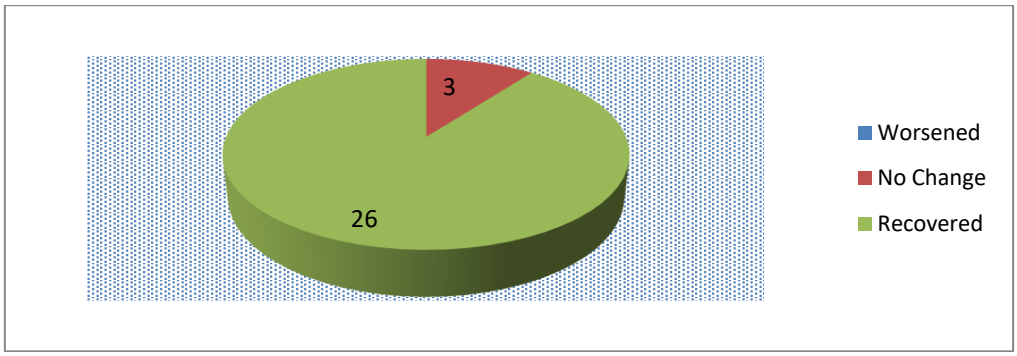

Figure 5. Diagram showing how hygene conditions have changed for 29 enterprises after shifting GAP

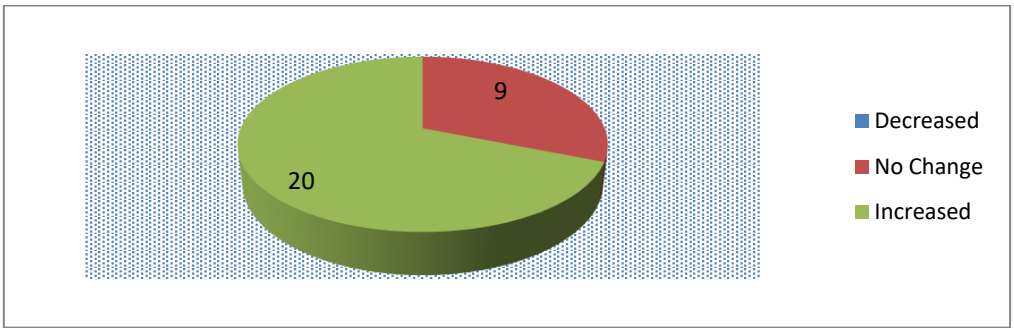

Figure 6. Diagram showing how market shares have changed for 29 enterprises after shifting GAP

The amount of decrease was fixed as 5 kg/da (9,82%). The difference was found as important statistically for 2 periods averages at both evaluations (95% safety interval, t-test MS Excel). It was fixed that although the amount of fertilizer used by the 29 enterprises for unit area has been decreased the effectiveness of fertilizer usage of 21 enterprises has increased.

The usage effectiveness of agricultural tools and machines

In figure 4, the diagram showing how the usage effectivenesses of the tools and machines of 29 enterprises have changed after shifting to Good Agricultural Practices is given.

It was determined that at 51,72% of the 29 enterprises shifted to Good Agricultural the usage effectivenesses of the agricultural tools and machines have increased.

Hygene conditions in the enterprises

In figure 5, the diagram showing how hygene conditions of 29 enterprises have changed after shifting to Good Agricultural Practices is given. It is fixed that hygene conditions 89,6% of 29

enterprises shifted to Good Agricultural Practises have got better.

Market shares

Market shares of 20 enterprises after shifting to Good Agricultural Practises have increased 13,68% as an average. It is fixed that in 9 enterprises there was not any change. In figure 6, the diagram showing how market shares of 29 enterprises have changed after shifting to Good Agricultural Practices is given.

Conclusion

There isn't any positive effect of Good Agricultural Practises on the crop quantity from the unit area and the total crop of the citrus growing enterprises but on the the quality of the crop obtained. The sales price of the product increases naturally as the quality of product increases. It is fixed that although the amount of chemicals have decreased, the effectivenesses of the usage of chemicals have increased. It has been determined that the fertilizer use efficiency increases despite the decrease in the amount of fertilizer thrown into the unit area. It is fixed that shifted to Good Agricultural Practises the effectivenesses of the usage of agricultural tools and machines have increased. Trainings on First Aid, Basic Hygiene, Good Agricultural Practices, Orchard Security and Safety Rules are given to the producers during certification period. As a result of this it is fixed that the hygene conditions have got better at the enterprises which shifted to Good Agricultural Practises. After Good Agriculture Practices, the market share of the enterprises has increased. By the developments on Good Agricultural Practices, as our fruit-vegetable production in the first place all our agricultural products and exportation will get the chance of competition both inside and o utside markets. While offering secure products to outside markets, our people will be provided with hygineic and secure products to consume. The producers are happy with joining to the project. The producers negotiated have declared that they were more conscious on using pesticides and fertilizers and more aware of the environment and nature conciousness.

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