Journal of Positive School Psychology
2022, Vol. 6, No. 2S, 162-189

Phytosanitary Status And Its Influence On The Level Of Exports Of Cucurbits From Tacna, Period 2001-2018

Sobeyda M. Mazuelos Chávez[1] , Charly E. Chávez Lara[1] , Marco A. Vera Zúniga[2] , Ada Luz Flores Ortega[2] , Luis A. Palao Iturregui[2] , Juan C. Luna Quecaño[2] , Ernesto J. Chura Yupanqui[2]

[1]Universidad Privada de Tacna Perú, ORCID ID: 0000-0001-9881-4253 : sobeyda.mazuelos@gmail.com
[1]Universidad Privada de Tacna Perú, ORCID ID: 0000-0002-2491-5438 ; chavez_lara_charly@hotmail.com
[2]Universidad Nacional del Altiplano Puno Perú, ORCID ID: 0000-0002-2014-2845 : mveradocente@gmail.com
[2]Universidad Nacional del Altiplano Puno Perú ,ORCID ID: 0000-0003-0565-9720 : adaflores1624@gmail.com
[2]Universidad Nacional del Altiplano, Puno Perú, ORCID ID: 0000-0002-8527-8866 : lpalao@hotmail.com
[2]Universidad Nacional del Altiplano, Puno Perú , ORCID ID : 0000-0002-4440-9276 : lunaqjuanc@gmail.com
[2]Universidad Nacional del Altiplano, Puno Perú., ORCID ID: 0000-0003-4227-220X : ernestochuray@yahoo.com
Corresponsal: e-mail: ernestochuray@yahoo.com

Abstract

In the national context, specifically in the area of Tacna, the increase of cucurbit exports has been noticed; therefore, the objective of this research was to determine how the phytosanitary status influences the exports of cucurbits from Tacna in the period: 2001-2018. Regarding the methodological framework, the type of research is considered basic; the design is non-experimental and longitudinal; the level of research is explanatory. The sample was constituted by the records of export data, being a total of 4,935 data of exports of pumpkin, melon and watermelon. The instrument used was the documentary analysis guide. The study confirmed the general hypothesis that phytosanitary status influences cucurbit exports from Tacna in the period: 2001-2018. The export processes of cucurbits (watermelon, melon and squash) in the Tacna region, show a sustained growth between 2007 and 2018, according to the results obtained in the time series analysis, determined by the phytosanitary status achieved with the declaration of fruit fly free area in 2007.

Key words: Phytosanitary status, exports, phytosanitary measures, cucurbits, Chilean market.

1. Introduction

At the beginning of the 21st century, in the context of the global market economy, Peruvian trade policy promotes the opening of new markets for the export of non-traditional products, particularly those of agricultural origin. However, the phytosanitary regulations established at the international level constitute the main non-tariff barrier for agricultural exports.

Exports of traditional products account for 70% of total exports (with the mining sector being relevant). The rest of the exports correspond to non-traditional items and

services, whose main items of non-traditional exports are: agriculture (with 37% of the non-traditional exported value); chemical (13%); textile (13%); fishing (11%); and others (25%) (MINCETUR, 2020).

Peru has achieved sustained economic growth in the last 20 years, this growth is due in part to the policy of trade liberalization that was accentuated with the negotiation and signing of 29 Bilateral Investment Agreements and 16 Free Trade Agreements (FTAs) that facilitated an increase in the exportable supply and the number of exporting companies. Currently, these 16 FTAs cover 93% of Peru's total exports.

In the Tacna region, until 1996 cucurbits were being exported to Chile, especially watermelon and pumpkin without difficulties and due to the report of an adult capture of the South American cucurbit fly Anastrepha grandis, Chile suspended the entry of cucurbits from Peru (DRAT, 2020).

Subsequently, the National Agricultural Health Service (SENASA) demonstrated technically and scientifically to the Agricultural and Livestock Service of Chile, the non-presence of this pest in the valleys of Tacna and Moquegua, establishing in 2007 the "Work Plan" for the export of fruits of melon (Curcumis melo), watermelon (Citrullus lanatus) and pumpkin (Curcubita máxima) from the Republic of Chile, from the departments of Tacna and Moquegua, through the application of the Integrated System of mitigation measures of mitigation of the pest, watermelon (Citrullus lanatus) and pumpkin (Curcubita máxima) from the Republic of Chile, from the departments of Tacna and Moquegua, by means of the application of the Integrated System of risk mitigation measures" through this work plan the Chilean market was reopened and exports were resumed (SENASA(a), 2019).

In addition, the above is noted with the information reported by the Ministry of Agriculture: the 2008 - 2009 agricultural campaign of the cucurbit export program was superior to the past agricultural campaigns, in this campaign 116 producers of the low area (La Yarada, Los Palos) and middle (Magollo) were registered, having installed 215.5 has. with these crops. For example, 76.5 hectares of squash were planted with the following varieties: carga (8 hectares), sweet potato (52 hectares), crespo (11.5 hectares) and Italian squash (5 hectares). Of watermelon, 137 ha of the varieties Santa Amelia (135 ha) and Starbrite (2 ha) were installed, complemented with smaller areas of melon and gherkin. (DRAT, 2020)

Regarding the volume of exports to the Chilean market, these were 2,662.79 metric tons, having been exceeded by 60.5% with respect to the agricultural campaign 2006 - 2007 which was 1,719.58 metric tons. Exports by crop were 509.97 metric tons of pumpkin, 40.35 metric tons of zucchini, 2,101.48 metric tons of watermelon and 10.97 metric tons of melon.

However, it is indicated that, in the first years of the first decade of the XXI century, there was complexity of trade, the export sector faces challenges in terms of competitiveness, which is not yet fully resolved; therefore, the role of public policy is to solve these challenges. The problems identified are: Insufficient market development, incipient support to exporters, bureaucratic administrative systems, i.e., there was not also the development and implementation of the Foreign Trade Single Window (VUCE) as a mechanism for modernization and simplification of export and import processes. Lack of an export culture, due to the fact that there were no frequent communication events to promote the productive initiative with a view to exporting.

For the export of cucurbits, the SENASA (2007) indicates that one of the benefits of the area free of fruit flies, is the opening of 31 new international markets and, thus, since 2007 began exports of cucurbits to the demanding Chilean market, and that year by year has been increasing the areas of cultivation of watermelon, squash, melon, among others.

But the capacities for internationalization and consolidation of an exporting culture are still not fully generated. Exporters do not know how to successfully face the challenges of globalization; the capacities for internationalization are not generated and strengthened, as well as the promotion of an exporting culture, laying the foundations for an adequate development of Peruvian foreign trade.

Therefore, although it is true that there are several factors that are now contributing to increase exports of cucurbits, such as development of exportable supply, market development, trade facilitation (SWF) and development of an export culture and use of trade agreements; However, the most important is the phytosanitary status, i.e. products free of the fruit fly pest; therefore, it is important to know what is the impact of the phytosanitary status on the level of exports of cucurbits exported from Tacna to the Chilean market.

In the international context, the growth in the level of agricultural exports of primary products is notorious. In Peru, specifically, cucurbits such as pumpkin, watermelon and melon are exported to the Chilean market; therefore, quantitative (trade) and qualitative (legal framework, agreements, etc.) information on the world market is presented, which allows visualizing the behavior of the variables that characterize that environment and its influence on the current situation of exports.

The Tacna region presents a potential commercial and service development given that it has a particular economic and geopolitical condition (DRTPET, "n.d."), regarding the conditions for the development of agriculture the (GRT, 2016), considers that these, are favorable, among which stand out its suitable climate, the availability of ecosystems, favorable phytosanitary conditions (fruit fly free zone) and its integrated land connectivity with regions of Chile and Bolivia.

It is in this sense that, the purpose of this research, focuses on determining, how the phytosanitary status influences the exports of cucurbits during the period: 2000 - 2018, period in which two phases are identified the first (2000 - 2007) characterized by not having the phytosanitary status and the second phase (2008 - 2018) for having established a favorable phytosanitary status for the export of agricultural products.

2. Objectives

2.1 General objective

To determine how phytosanitary status influences cucurbit exports from Tacna in the period: 2000 - 2018.

2.2 Specific objectives

a) Determine how phytosanitary status influences melon exports from Tacna in the period: 2000 - 2018.

b) Determine how phytosanitary status influences watermelon exports from Tacna in the period: 2000 - 2018.

c) Determine how phytosanitary status influences exports of Tacna squash in the period: 2000 - 2018.

3. Hypothesis

3.1 General assumptions

Phytosanitary status significantly influences cucurbit exports from Tacna in the period: 2001- 2018.

3.2 Specific hypotheses

a) The phytosanitary status significantly influences melon exports from Tacna in the period: 2001 - 2018.

b) The phytosanitary status significantly influences watermelon exports from Tacna in the period: 2001 - 2018.

c) The phytosanitary status significantly influences the exports of pumpkin from Tacna in the period: 2001 - 2018.

4. Type and design of research

4.1 Type of research

The type of research for the present study is pure or basic, because it has the purpose of increasing the theoretical and general knowledge of the fundamental principles of the variables of study, such as plant protection and the level of exports (Gonzales, 2004).

4.2 Research Design

The present study is considered as a non-experimental, longitudinal research given the nature of the variables subject of this research work, it is descriptive because it aims to measure or collect information independently or jointly on the variables referred to as follows (Hernández et al., 2014).

4.3 Population and sample

The unit of study was constituted by the data of exports of cucurbits from the city of Tacna to the Chilean market.

4.3.1 Population

The population was constituted by the 4,935 data of exports of cucurbits from Tacna to the Chilean market, during the period 2001 - 2018.

4.3.2 Sample

A sample space was not considered, since the total of Customs Declarations of Goods (DAM) were taken into consideration, which in total are 4 935 registered processes, shown in Table 1, corresponding to the crops of melon, watermelon and pumpkin, during the period 2000-2018.

5. Procedures, techniques and instruments

5.1 Procedures

The data collection consisted of a review of cucurbit export data records for the period 2001-2018 obtained from the National Superintendence of Customs and Tax Administration (SUNAT) and the National Agricultural Health Service (SENASA) in order to determine the following:

- Context of the agro-export potential of the department of Tacna.
- Export operations of cucurbits to the neighboring country of Chile.
- Literature review with methodologies and protocols for exporting agricultural products.

5.2 Techniques

In the present study, the documentary analysis technique was used to assess the level of exports of cucurbits in the period 2001 - 2018, such as squash, melon and watermelon.

5.3 Instruments

For the study, the SUNAT database was used to evaluate the level of exports of cucurbits, such as squash, melon and watermelon.

For the process of analysis of information corresponding to the export of cucurbits, two periods of analysis were identified, the first corresponds to the period from 2001 to 2007, during which there was no phytosanitary status for the export of non-traditional products. The second period considers 2008 to 2018, a period in which, given the policies for the promotion of exports, the National Agricultural Health Service managed to establish the Tacna and Moquegua regions as areas free of fruit flies, thus allowing to obtain the phytosanitary status required for cucurbit exports.

Data processing for cucurbit exports and by crop (melon, watermelon and squash) was done using spreadsheets (Excel) and the statistical software Statistical Product and Service Solutions (SPSS).

For the statistical analysis of exports, the classical multiplicative time series method

was used, which is a quantitative method used to determine patterns of change in statistical information at regular intervals in the data collected over time. (Levin & Rubin, Statistics for Management and Economics, 2011).

The multiplicative method was chosen for the decomposition of the series in trend, using the variable unit (Export of Cucurbitaceae), and the other components, seasonality and cycles, using indexes, obtaining as value one, the average of the series in the period.

As it refers (Esparza, 2,020) from a theoretical perspective, the classic focus of analysis of temporal series considers that the behavior of a variable in time is the result of the integration of four fundamental components: tendency (Tt), cycle (C_t), seasonal component (S_t) and irregular component or noise (E_t).

Thus, with classical methods a time series Xt is a function of these four components.

$$X_t = f(S_t, T_t, C_t, E_t) \quad (1)$$

Multiplicative Model $X_t = (S_t \times T_t \times C_t \times E_t)$ (2)

Where:

S_t = seasonal component;

T_t = long-term trend in the series;

C_t = long-term cyclical component;

E_t = irregular or residual component.

The seasonality of a series (St), can be observed in the pattern that repeats every year, they are the regular movements that have a monthly periodicity. For the analysis of the seasonal component, (St) was used in adjustment method n obtaining seasonal indices of the variable export of cucurbits per month per year. The seasonal indices reflect periodic, relatively regular fluctuations that occur within each 12-month period, year after year (Levin & Rubin, Statistics for Management and Economics, 2011).

It is considered (Ti), to the smooth and regular movement of the cucurbit export series in the long term. It shows the direction of the movement of the variable, which can be increasing, decreasing or stable. For the analysis of the trend component (Ti), the temporal data of the cucurbit export variable were processed through the calculation of moving averages centered in 12 periods, in order to extract the seasonal and irregular component of the data.

The cyclical component (Ct) reflects variations greater than one year; it is an oscillating factor around the trend (Esparza, 2,020)

The irregular component or noise (E_t), includes the variations of the series that are unknown to us. It is characterized because it does not respond to a systematic or regular behavior and, consequently, it is not possible to predict it. The classical approach attributes this irregularity to chance. In this way, noise is made up of everything that is not explained by the trend, the cycle and seasonality.

The following equation was used to calculate the moving averages

$$\mathbf{Yt = 1/12(Y_{t+6} + \ldots\ldots + Yt+\ldots} \quad (3)$$

For the long-term trend analysis (Ti), the simple extrapolation method was used, which is based on the development of a deterministic regression model of time series of a single equation, called linear trend. The trend of the volume of exports was estimated by means of a linear regression model and semi-logarithmic regression for analysis of the monthly variation rate. The trend analysis sought to verify a general or persistent long-term pattern, upward or downward (Levine et al., 2011).

$$Y_t = \alpha + \beta_t + \varepsilon \quad (4)$$

$$\ln Y_t = \alpha + \beta_t + \varepsilon \quad (5)$$

6. Results

At this point, the results are shown in relation to the research questions and the hypotheses posed, for this purpose, a logical order was followed in the analysis of internal consistency of the data, reliability and validity of content of the variables.

6.1 Analysis of exports during the study period.

Once the validity and reliability of the instruments were obtained, the field work was carried out by applying the instrument to the entire sample, for which purpose the documentary analysis of the data provided by the tax administration was applied.

First, contact was made with the different institutions related to the variables under study, i.e., the Tax Administration (SUNAT), the National Agricultural Health Service (SENASA), as well as the entrepreneurs involved in the export of cucurbits.

The websites of the Tax Administration (SUNAT) and the National Agricultural Health Service (SENASA) were also reviewed.

Subsequently, the documentary analysis guide was applied to the information collected from the tax administration (SUNAT), the National Agricultural Health Service (SENASA).

6.2 Export of cucurbits from Tacna to the Chilean market in the period 2001 - 2018.

Table 1 shows the consolidation of variables involved in the export processes of cucurbits registered by SUNAT. It should be noted that the universe of analysis of this research was 4,935 processes of cucurbit export to the Chilean market, identified through the registration of customs declarations of goods (DAM), with respect to the three crops that make up the group of cucurbits, correspond to 152 processes for the export of melon, 3,456 for export of watermelon and 1,328 for export of pumpkin.

Table 1.

AÑO	Melon			Sandia			Zapallo			Cucurbitaceas	FOB por	Numero de
	Cantidedad exportada en KG (1)	Promedio de FOB por kilo (1)	Procesos de exportacion DAM (1)	Cantidedad exportada en KG (2)	Promedio FOB por kilo (2)	Procesos de exportacion DAM (2)	Cantidedad exportada en KG (3)	Promedio FOB por kilo (3)	Procesos de exportacion DAM (3)	exportadas en kg	kilo	procesos DAM
2001				31,000	0.100	6				31,000	0.100	6
2005				47,100	0.100	2				47,100	0.100	2
2006				206,440	0.100	9				206,440	0.100	9
2007	226,763	0.19	20	270,547	0.190	25				497,310	0.188	45
2008	16,299	0.23	6	1,378,356	0.107	95				1,394,655	0.114	101
2009	100,260	0.33	10	2,752,674	0.102	129				2,852,934	0.118	139
2010	54,811	0.12	8	2,409,661	0.101	126				2,464,472	0.102	134
2011	1,734	0.20	3	3,046,039	0.093	158				3,047,773	0.095	161
2012	2,820	0.07	1	3,881,199	0.120	191	1,423,859	0.179	84	5,307,878	0.138	276
2013	135,571	0.56	15	5,541,471	0.149	262	1,515,614	0.114	107	7,192,655	0.156	384
2014	36,251	0.07	7	6,545,510	0.109	317	1,678,973	0.100	83	8,260,734	0.107	407
2015	39,319	0.22	6	9,880,763	0.103	485	3,552,338	0.098	154	13,472,420	0.103	645
2016	159,782	0.15	20	10,284,666	0.101	475	5,812,238	0.101	279	16,256,686	0.102	774
2017	315,804	0.20	35	11,726,367	0.102	548	7,383,362	0.104	314	19,425,533	0.107	897
2018	161,565	0.13	21	13,880,520	0.105	627	8,162,861	0.098	307	22,204,946	0.103	955
Total	**1,250,979**	**0.22**	**152**	**71,882,313**	**0.108**	**3,455**	**29,529,245**	**0.107**	**1,328**	**102,662,536**	**0.111**	**4,935**

Consolidated export database 2001 - 2018

Source: Own elaboration based on SUNAT database.

Regarding exporters, from the period under study (Table 2), 86 agents were identified according to their unique taxpayer registration RUC (see Annex 2), in relation to the characteristics of the first phase 2000 - 2008, only 3 agents made exports, in the second phase 2008 - 2018, the participation of 83 exporters is verified.

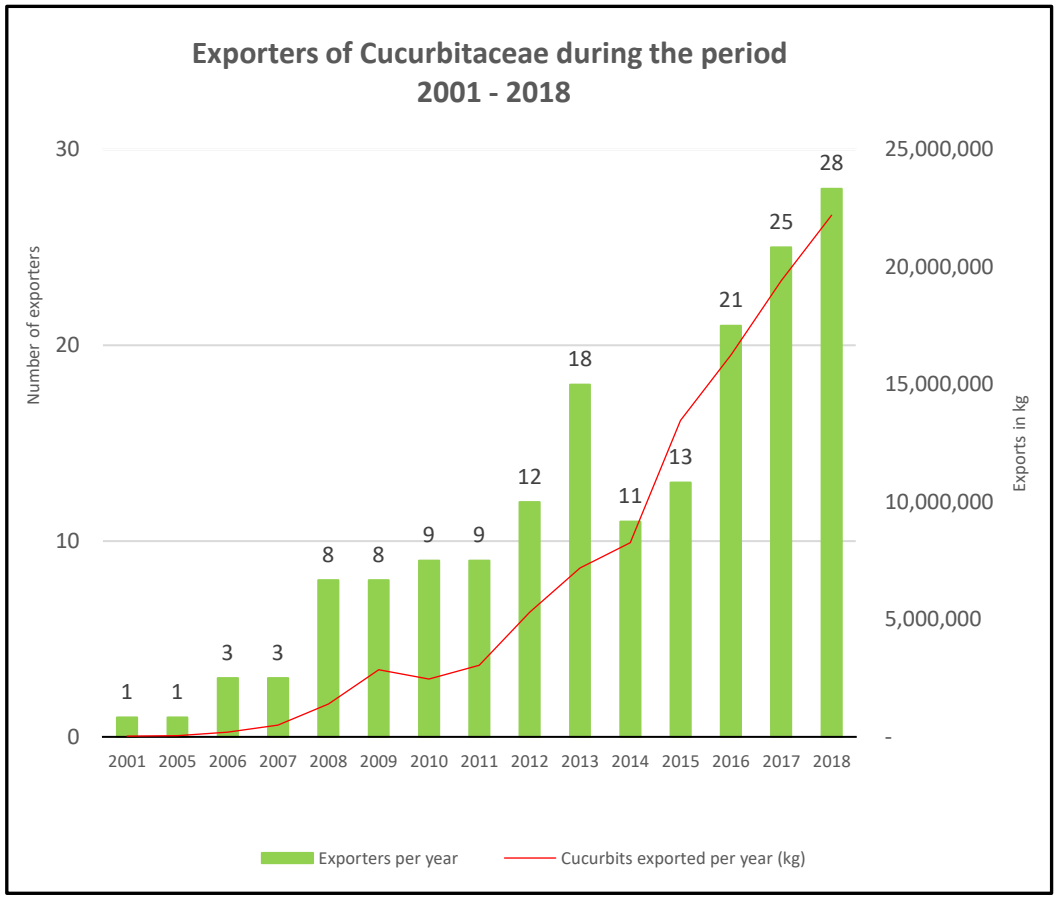

Figure 1. Exporters of cucurbits period 2001 – 2018

On the other hand, 14 exporters were identified who made more than 100 export processes (DAM) between the period from 2001 to 2018, of them, 5 have legal personality and 8 correspond to a natural person with business (classification according to RUC), represented in Table 2. On the other hand, it was observed that the exporter with RUC number 1043709053 was the one who achieved the highest number of export processes in the study period.

Table 2. Cucurbits exporters database 2001 - 2018

EXPORTADOR	RUC	2001	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	tal gene
ORDOÑEZ CUTIPA ELVIRA	10437090535	-	-	-	-	-	-	2	19	17	3	51	115	153	248	108	**716**
AGRONEGOCIOS INTERNACIONALES JOSE S.R.L.	20532845158	-	-	-	-	-	-	-	-	33	63	64	116	88	89	75	**528**
DAMAJHU EXPORT IMPORT COMERCIALIZADORA E	20532603499	-	-	-	-	-	-	11	40	78	81	81	79	52	54	43	**519**
NEGOCIACIONES LULUMI S.A.C.	20532663394	-	-	-	-	-	-	-	-	-	-	-	122	93	98	94	**407**
MACHICADO APAZA MARIA ELENA	10005207164	-	-	-	-	15	24	39	35	4	70	110	19	-	-	-	**316**
AGROINDUSTRIAL BELEN DEL SUR EMPRESA IND	20600639766	-	-	-	-	-	-	-	-	-	-	-	47	84	55	38	**224**
CHURACUTIPA LLANQUE FELIX CLAUDIO	10004944271	-	-	-	-	-	-	-	-	-	-	-	39	54	42	31	**166**
AGRONEGOCIOS ANDINOS EMPRESA INDIVIDUAL DI	20520064819	-	-	5	17	3	36	25	30	3	35	1	-	5	-	-	**160**
INVERSIONES Y EXPORTACIONES ORDOÑEZ S.A.	20601703425	-	-	-	-	-	-	-	-	-	-	-	-	-	1	143	**144**
CHAMBILLA VARGAS NISBET LIZZY	10458702158	-	-	-	-	-	-	-	-	-	-	-	-	9	41	76	**126**
CONTRERAS ORTIZ HOLANDO MAURICIO	10403400462	-	-	-	-	-	-	-	-	-	14	10	8	87	-	-	**119**
QUISPE CERVANTES EDGAR	10417103061	-	-	-	-	-	-	-	-	89	17	-	-	-	-	10	**116**
HUILLCA TTITO SILVIA	10411758538	-	-	-	-	-	-	-	-	-	-	-	-	15	46	41	**102**
VIDAL FLORES LEONARDO LORENZO	10004704067	-	-	-	-	-	-	-	-	-	23	49	30	-	-	-	**102**
IMPORTEXPORT AGROIND JOSE SCRL	20519942489	-	-	-	1	44	21	19	9	-	-	-	-	-	-	-	**94**
VILCA LLANQUE CESAR ISAIAS	10442071514	-	-	-	-	-	-	-	-	-	-	-	-	33	36	22	**91**
EMPACADORA VALLE DE CINTO S.A.C.	20533131248	-	-	-	-	-	-	-	-	-	9	2	15	10	9	29	**74**
FISHESLAKE SOCIEDAD COMERCIAL DE RESPONS	20600220528	-	-	-	-	-	-	-	-	-	-	-	-	-	24	46	**70**
GALLEGOS GUARINO JESUS ALFREDO	10702070037	-	-	-	-	-	-	-	-	-	-	18	48	1	-	-	**67**
EXPORTADORA IMPORTADORA NANDITO E. I. R. L. -	20532914494	-	-	-	-	-	-	-	-	6	31	12	-	-	-	-	**49**
TERRALUIS E.I.R.L.	20601595258	-	-	-	-	-	-	-	-	-	-	-	-	4	25	19	**48**
ROMERO ZARATE LUIS AUGUSTO	10411755725	-	-	-	-	-	-	-	-	-	-	-	-	45	-	-	**45**
GUTIERREZ ACERO MARIA LUISA	10708892799	-	-	-	-	-	-	-	-	-	-	-	-	-	24	13	**37**
COLQUE PERCA JORGE MANUEL	10005095897	-	-	-	-	11	-	20	5	-	-	-	-	-	-	-	**36**
FUNDO LA NORIA SOCIEDAD ANONIMA CERRADA	20532520950	-	-	-	-	-	-	-	-	19	-	-	-	-	15	-	**34**
AGROINDUSTRIA INTERNACIONAL MAXIMO DEL S	20603605528	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31	**31**
IMPORT EXPORT AQUINO CAR SOCIEDAD ANONIM	20602241662	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	**30**
EXPORTAFRUT HERMINIO E.I.R.L.	20602036376	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	**26**
COMPANIA DESHIDRATADORA TACNA S.A.C.	20535301507	-	-	-	-	2	-	1	11	11	-	-	-	-	-	-	**25**
EL VIEJO OLIVAR S.A.C.	20519917964	-	-	-	16	6	-	-	-	-	-	-	-	-	-	-	**22**
PERUVIAN GROWERS SAC	20515091026	-	-	-	-	-	21	-	-	-	-	-	-	-	-	-	**21**
INSTITUTO DE EDUCACION SUPERIOR TECNOLOG	20519860326	-	2	2	1	-	8	7	-	-	-	-	-	-	-	-	**20**
NEGOCIACIONES LA GLORIETA EMPRESA INDIVI	20449250011	-	-	-	-	-	-	-	-	-	-	-	-	11	5	4	**20**
IMPORTADORA & EXPORTADORA YABAPA EMPRESA	20533149619	-	-	-	-	-	-	-	-	-	-	-	-	-	6	13	**19**
AQUINO CHIPANA AUREA	10402363342	-	-	-	-	-	-	-	-	5	10	-	-	-	-	3	**18**
MILANOS E.I.R.L.	20520045512	-	-	-	-	8	9	1	-	-	-	-	-	-	-	-	**18**
BX GROUP E.I.R.L.	20600642601	-	-	-	-	-	-	-	-	-	-	-	-	16	1	-	**17**
JUMAPER S.A.C	20448625142	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	**17**
PROCESADORA Y EXPORTADORA TACNA SOCIEDAD	20519932254	-	-	-	-	-	14	1	-	-	-	-	-	-	-	-	**15**
AGROEXPORTACIONES VIDAL S.A.C	20601476402	-	-	-	-	-	-	-	-	-	-	-	-	5	9	-	**14**
IMPORT Y EXPORT AGRINOVA BMI S.R.L.	20600335911	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	**14**
TALEXIO CASTERNOQUE MARLITA	10451906963	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	**14**
PEREZ HONORI MARIA MAGDALENA	10005020111	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	**13**
GRUPO JEAN LOGISTICA S.A.C.	20601468833	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	**12**
EXPORTADORA EL PARQUE PERU SAC	20547669046	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	**12**
CONSORCIO AGROEXPORTADOR MOQUEGUA	20449464321	-	-	-	-	11	-	-	-	-	-	-	-	-	-	-	**11**
RODRIGUEZ AGUILAR KARINE YULIANA	10437001940	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	**11**
AGROINDUSTRIAS VALLEDOR EMPRESA INDIVIDU	20533145389	-	-	-	-	-	-	-	-	-	4	5	-	-	-	-	**9**
ASOCIACION DE EXPORTADORES AGROPECUARIO	20449347529	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	**9**
SERVICIOS MULTIPLES DEL SUR CAPLINA EMPR	20532583790	-	-	-	-	-	-	-	-	7	2	-	-	-	-	-	**9**
IMPORTADORA EXPORTADORA MABRAKS S.A.C.	20533310258	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	**8**
NOVOLIZ S.A.	20112302370	-	-	-	-	-	-	-	5	3	-	-	-	-	-	-	**8**
TICONA RAMOS SUSANA ELSA	10004852325	-	-	-	-	-	5	3	-	-	-	-	-	-	-	-	**8**
AGRONEGOCIOS WALTER EMPRESA INDIVIDUAL D	20603853777	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	**7**
ALBITES BENDEZU MARCOS ANTONIO	10153595904	-	-	-	-	-	-	-	-	-	-	-	-	2	5	-	**7**
ASOCIACION EXPORTADORA AGRICOLA DE TACNA	20519640041	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**6**
NEGOCIOS LATINOAMERICANOS SOCIEDAD ANONI	20532622795	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	**6**
YUGRA SOSA MARIO MARTIN	10044215859	-	-	-	-	-	-	5	1	-	-	-	-	-	-	-	**6**
CHOQUE CRESPIN SANTOS AMERICO	10419699646	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	**5**
SOCIEDAD AGRICOLA CAMPOS VERDES SOCIEDAD	20533323589	-	-	-	-	-	-	-	-	-	-	-	-	1	3	1	**5**
AGRICOLA DON ANGEL S.A.C.	20533095187	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	**4**
MAMANI RAMOS CESAR JAVIER	10005015427	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	**4**
VEGETALK WORLD PERU S.A.C.	20535034461	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	**4**
CAMA ASCENCIO DORIS	10005064029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	**3**
CARREÑO Y DIAZ SOCIEDAD ANONIMA CERRADA	20600277261	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	**3**
LANCHIPA BERRIOS GIULIANA DENISSE	10400456581	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	**3**
RIVERA CARPIO LUIS ANGEL	10448818891	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	**3**
TIEMPO LIBRE.COM E.I.R.L.- TIEMPO LIBRE.	20600843312	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	**3**
AGROEXPORTACIONES OLMOS E.I.R.L.	20454944039	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	**2**
AGROIND. Y COMERCIALIZ. GUIVE E.I.R.L.	20318165051	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	**2**
ASOCIACION AGROEXPORTADORES UNIDOS SR. L	20533099841	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	**2**
B & S SERVICE SOCIEDAD COMERCIAL DE RESP	20532734321	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	**2**
ESPECIERA DEL PERU SOCIEDAD ANONIMA CERR	20533010530	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	**2**
TROPICAL FRUTAS PIURENSE S.R.L.	20526503211	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	**2**
ASOCIAC.DE PRODUC.Y EXPORT.DE TACNA APET	20325813319	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	**2**
AGRO EXPORTADORA FRUTOS DEL SUR S.A.C.	20602522335	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	**1**
AGROALIMENTOS ZGJA SOCIEDAD COMERCIAL DE	20519980224	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	**1**
AGROEXPORTADORA TERRA OLIVO SOCIEDAD ANO	20533295275	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	**1**
AGROINDUSTRIA ADL S.R.L.	20601445621	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	**1**
EMPRESA AGROEXPORTADORA MAS PERU E.I.R.L	20601639620	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	**1**
ESCOBAR DE LLANOS ROSA	10004804746	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	**1**
EXPOPERU 2000 EMPRESA INDIVIDUAL DE RESP	20449470053	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	**1**
EXPORT IMPORT GEMA PERU S.A.C.	20532761566	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	**1**
IMPORT & EXPORT AGROS DEL NORTESUR E.I.R	20533271929	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	**1**
LUPACA JILA JUAN	10004203238	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	**1**
LUPACA RAMOS EDWIN	10013436849	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	**1**
Procesos de exportacion (DAM)		6	2	9	45	101	139	134	161	276	384	407	645	774	897	955	4935
Exportadores por año		1	1	3	3	8	8	9	9	12	18	11	13	21	25	28	

6.3 Time series analysis of cucurbit exports 2001 -2007 without phytosanitary status.

The exports of cucurbits from Tacna to the Chilean market, present a behavior in two phases, the first corresponds to the years 2001 - 2007, with sporadic export processes and low volume, The second phase corresponds to the

years 2008 - 2018, with continuous and dynamic export processes with increases in the volume of cucurbits exported and with a phytosanitary status of area free of the fruit fly pest.

Given the characteristics of export behavior in the first phase (small number of processes and low export volumes), it was not feasible to apply the classic multiplicative model of time series with centered moving averages, a model that was applied for the second phase 2008-2018, since it meets the conditions for its application (continuous series of data by months per year).

Table 3 shows the low continuity in the export processes, as well as the low exported volumes, during the first phase 2000 - 2007, characterized processes little dynamic and irrelevant the exported quantities and with a phytosanitary status of area of low prevalence of the pest of fruit flies. 62 export processes were identified according to customs declarations of processed DAM goods, corresponding to the year 2001, 6 DAM (9.68%), zero in the years 2002, 2003 and 2004, 2 DAM (3.23%) in the year 2005, 9 DAM (14.52%) in the year 2006 for a single crop watermelon, in the year 2007 were recorded 45 DAM (72.58%) of which 20 corresponds to melon and 25 to watermelon.

Table 3. Cucurbits export processes period 2001 - 2007

YEAR	Melon		Watermelon		Zapayo		TOTAL	TOTAL
	Melon Export Processes (DAM)	Volume Exported (Kg) Melon	Watermelon Export Processes (DAM)	Volume Exported (Kg) Watermelon	Zapayo Export Processes (DAM)	Exported Volume (Kg) Zapayo	Export Processes (DAM)	Exported Volume (Kg)
2001			6	31,000			6	31,000
2005			2	47,100			2	47,100
2006			9	206,440			9	206,440
2007	20	226,763	25	270,547			45	497,310
	20	**226763**	**42**	**555087**	**0**	**0**	**62**	**781850**

Regarding the analysis of the FOB price of cucurbit exports, Figure 2 shows that during the period 2000 -20008 it maintains a range between 0.1 and 0.2 cents, with an exceptional rise in October 2010 to 0.5 cents, in the case of watermelon.

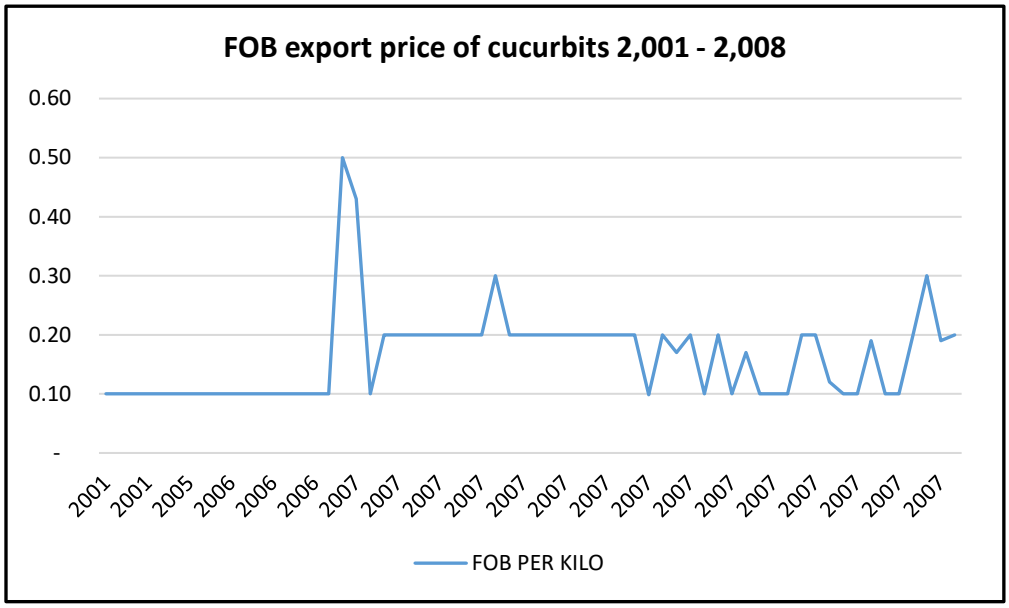

Figure 2. Cucurbits exports (kg) 2001 - 2008 month by year and price (FOB)

6.4 Time series analysis of cucurbit exports 2008 - 2018, with phytosanitary status.

The second phase of evaluation corresponds to the period 2008 - 2018, determined from the publication of the Directorial Resolution No. 051-2007-AG-SENASA, dated 26 December 2007, which declares the regions of Tacna and Moquegua free of the fruit fly, phytosanitary status recognized by the National Plant Protection Organizations through the World Trade Organization (WTO) and the General Secretariat of the Andean Community of Nations.

The data analysis was based on the classic multiplicative method of time series for the exported quantity of cucurbits (kg), with this method was achieved the decomposition of the series using the variable unit (exported quantity) and the other components, seasonality and cycles, using indexes, obtained as value 1 the average of the series in the period.

$$Yi = Si \times Ti \times Ci \times Ei \quad \text{.....} \quad (1)$$

Where:
Si = Seasonal component
Ti = Long-term trend in the series
Ci = Cyclic component

Ei = Residual component or noise

6.5 Seasonal component of the series Quantity exported of cucurbits in the period 2008 - 2018

From the seasonal decomposition method, 4 additional data series are obtained, generated by the statistical program, which are the moving average series, the seasonal factor (%), the seasonally corrected series, the smoothed trend cycle series and the irregular error component, whose result is presented in Table 4.

Table 4. Seasonal decomposition of the series quantity exported of cucurbits (kg).

DATE_	Serie original	Serie de media móvil	Proporción de series originales con series de media móvil (%)	**SAF_ 1** Factor estacional (%)	**SAS-1** Series corregidas estacionalmente	**STC_1** Series de ciclo de tendencia suavizada	**ERR_1** Componente irregular (Error)
JAN 2008	-			109.9	0.000	258685.911	0.000
FEB 2008	173,000			27.0	641553.932	223044.026	2.876
MAR 2008	7,000			25.4	27578.145	151760.256	0.182
APR 2008	-			2.9	0.000	77412.247	0.000
JUL 2008	-	116823.333	0.0	3.4	0.000	0.000	
AUG 2008	-	110217.083	0.0	7.1	0.000	3104.710	0.000
SEP 2008	-	102717.083	0.0	38.9	0.000	13254.675	0.000
...							
...							
FEB 2018	425,700	1651281.783	25.8	27.0	1578667.682	1594304.210	0.990
MAR 2018	323,600	1655808.117	19.5	25.4	1274898.249	2477701.157	0.515
APR 2018	141,000	1745441.367	8.1	2.9	4897076.090	3304780.684	1.482
MAY 2018	53,572	1852871.875	2.9	1.1	4746208.063	3477178.285	1.365
JUN 2018	21,802	1868046.008	1.2	1.5	1430917.577	3538406.283	0.404
JUL 2018	104,897			3.4	3125094.793	3961427.749	0.789
AUG 2018	489,684			7.1	6913222.015	4672035.747	1.480
SEP 2018	1,883,993			38.9	4843078.117	4612870.522	1.050
OCT 2018	6,997,701			177.5	3941392.278	3692390.174	1.067
NOV 2018	8,948,097			415.8	2152276.972	2199023.930	0.979
DEC 2018	1,961,400			389.6	503402.539	1452340.807	0.347

From the calculation of seasonality indices in Table 5, it was possible to measure the seasonal variation of the exported quantity of cucurbits that reflects the short-term oscillations in the 12-month period, in this analysis the value of one refers to the average of exports of the period 2008 - 2018. The seasonal behavior in the export of cucurbits is explained by the seasonality of the crop harvest and planting, as well as the commercial window to the Chilean market.

6.6 Analysis of the trend component for the quantity exported of cucurbits in the period 2008 - 2018

For the long-term trend analysis, the simple extrapolation method was used, which is based on the development of a deterministic regression model of time series of a single equation, it was estimated by means of a linear regression model (equation 2), for which the smoothed trend cycle data series (STC_1), presented in table 4, was used.

$$Yt = \alpha + \beta t + \varepsilon_I \text{.....} \quad (2)$$

Table 5. Seasonality indices by month by year.

	Unstandardized coefficients		Standardized coefficients		
	B	Error	Beta	t	Sig.
Angular coefficient	269,997.69	21815.13	0.73	12.37	,000
(Constant)	-542,519,410.71	43913913.37		-12.35	,000

Período	Factor estacional (%)	Indice Estacional
Ene	109.9	1.1
Feb	27.0	0.3
Mar	25.4	0.3
Abr	2.9	0.0
Mar	1.1	0.0
Jun	1.5	0.0
Jul	3.4	0.0
Ago	7.1	0.1
Set	38.9	0.4
Oct	177.5	1.8
Nov	415.8	4.2
Dic	389.6	3.9
	Periodo	*12.0*

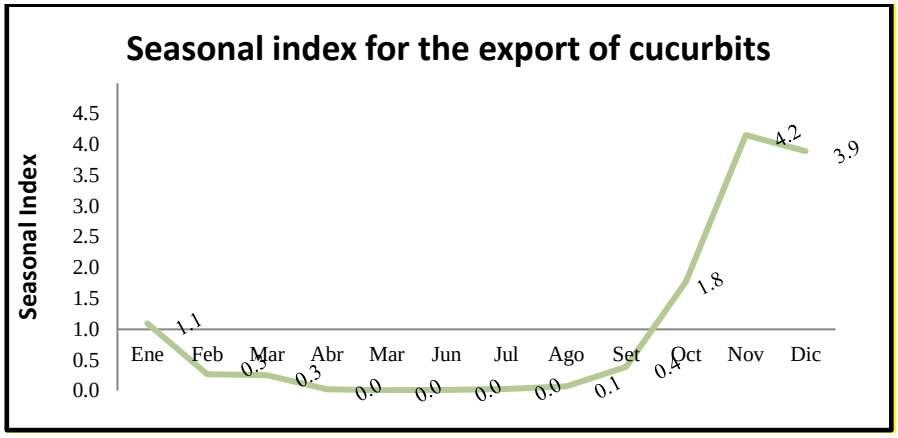

Figure 3. Seasonal index of cucurbit exports by month by year.

In this sense, Figure 3 shows that the intercept cuts the Y axis in the index 1 (it represents the average of exports in the period), therefore, it is inferred that, the indexes corresponding to the months of October with 1.8, November 4.2, December 3.9 and January with 1.1, present levels higher than the average trend, being the month of November the one that presents the highest seasonal index, which means that during this month the highest exported volumes are concentrated.

Table 6. Line regression coefficients

	Unstandardized coefficients		Standardized coefficients		
	B	Error	Beta	t	Sig.
Angular coefficient	269,997.69	21815.13	0.73	12.37	,000
(Constant)	-542,519,410.71	43913913.37		-12.35	,000

$$Yt = -542519410.71 + 269997.69\ (t) \quad \text{.....} \quad (3)$$

For the analysis of the monthly variation rate, the semi-logarithmic regression was used (equation 4).

$$LnY_t = \alpha + \beta_t + \varepsilon_i \text{.....} \quad (4)$$

Table 7. Semi-logarithmic Regression Coefficients

	Unstandardized coefficients		Standardized coefficients		
	B	Error	Beta	t	Sig.
Angular coefficient	0.552	0.066	0.592	8.376	0.000
(Constant)	-1,098.691	132.672		-8.281	0.000

$$LnY_t = -1098.691 + 0.552\ (t) \quad \text{.....} \quad (5)$$

Tables 6 and 7, represent the estimation coefficients of linear and semi-logarithmic trend for monthly exports of cucurbits from 2008 to 2018, the angular coefficients presented were significant (P<0.05), with the regression analysis of the equation it was possible to quantify the trend behavior of the export of cucurbits, that is, the existence of an ascending pattern of trend for the series represented in Figure 6. From the data of the linear regression (equation 3), a growth of 269 997.69 kg of cucurbits exported per period variation is observed.

Based on the estimation, semi-logarithmic (equation 4), a variation rate for the exported quantity of cucurbits of 55.2% in the period is evidenced, determining an average annual growth in the exported quantity of cucurbits.

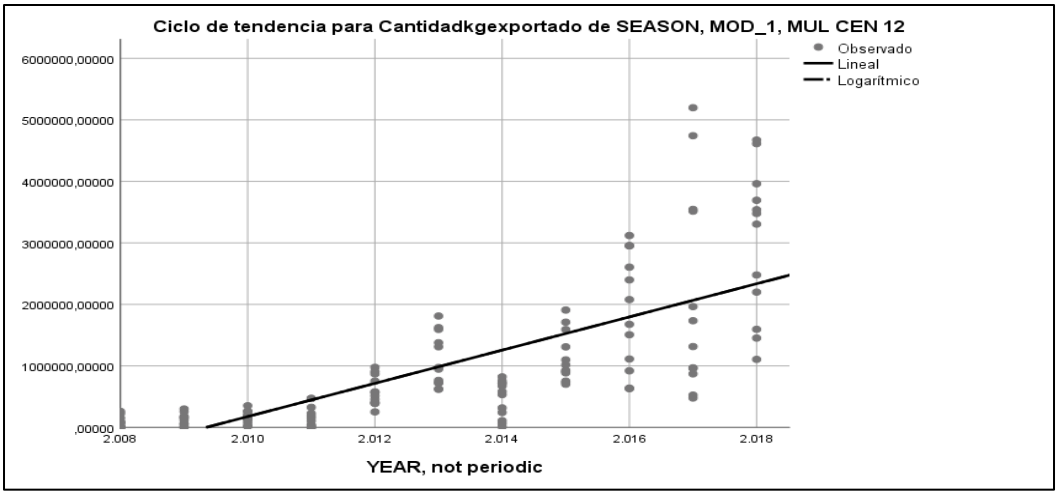

Figure 4. Trend graph for the series quantity of cucurbits exported 2008 - 2018 corresponding to the linear regression.

6.7 Analysis of the cyclical component for the quantity of cucurbits exported in the period 2008 - 2018

In a long-term perspective, Figure 5 shows the cyclical component of the exported quantity of cucurbits, in its four phases, peak, contraction, depression and expansion. The long-term fluctuations are well defined; however, the retraction of 2014 goes on to expand again from 2015 until the end of the period.

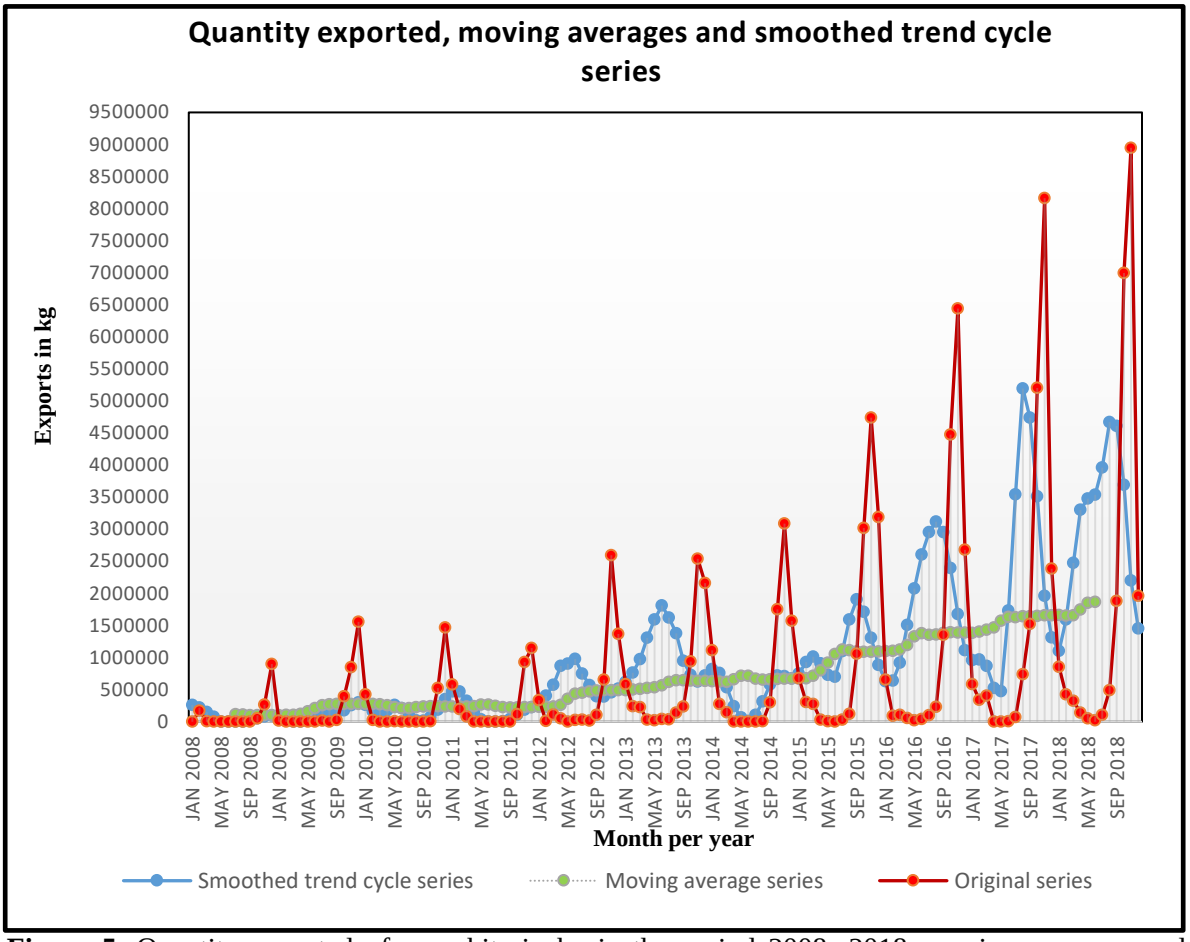

Figure 5. Quantity exported of cucurbits in kg in the period 2008 -2018, moving averages and smoothed trend cycle.

6.8 Time series analysis of melon exports.

The data analysis was based on the classical multiplicative method of centered moving averages for time series of the exported quantity of melon.

6.8.1 Seasonal component of the melon series.

From the seasonal decomposition method, for melon export, 4 additional data series are obtained, generated by the statistical program, which are the moving average series, the seasonal factor (%), the seasonally corrected series, the smoothed trend cycle series and the irregular error component, whose summary is presented in Table 8.

Table 8. Seasonal decomposition table of the quantity of melon exported.

DATE_	Serie original	Serie de media móvil	Proporción de series originales con series de media móvil (%)	**SAF_ 1** Factor estacional (%)	**SAS-1** Series corregidas estacionalmente	**STC_1** Series de ciclo de tendencia suavizada	**ERR_1** Componente irregular (Error)
JAN 2008	0			0.0	0.000	0.000	0.000
FEB 2008	0			0.0	0.000	0.000	0.000
MAR 2008	0			0.0	0.000	0.000	0.000
APR 2008	0			0.0	0.000	0.000	0.000
MAY 2008	0			8.3	0.000	0.000	0.000
JUN 2008	0			20.4	0.000	0.000	0.000
JUL 2008	0	1358.25	0.0	9.5	0.000	0.000	0.000
AUG 2008	0	1358.25	0.0	0.0	0.000	539.757	0.000
SEP 2008	0	1358.25	0.0	5.8	0.000	1389.360	0.000
OCT 2008	8334	1358.25	613.6	171.6	4857.810	2238.962	2.170
NOV 2008	7965	1358.25	586.4	285.6	2788.616	2009.052	1.388
…							
…							
MAY 2018	19402	23755.23	81.7	8.3	234917.750	108877.089	2.158
JUN 2018	14854	15917.25	93.3	20.4	72980.256	105237.371	0.693
JUL 2018	12254			9.5	129180.034	85379.818	1.513
AUG 2018	0			0.0	0.000	39535.748	0.000
SEP 2018	0			5.8	0.000	22635.559	0.000
OCT 2018	42000			171.6	24481.405	13844.289	1.768
NOV 2018	73055			285.6	25577.191	16686.199	1.533
DEC 2018	0			698.9	0.000	18107.154	0.000

From the calculation of seasonality indices in Table 9, it was possible to measure the seasonal variation of the exported quantity of melon that reflect the short-term oscillations in the period of 12 months, in this analysis the value of one refers to the average of exports of the period 2008 - 2018. The seasonal behavior in the export of cucurbits is explained by the seasonality of the crop and the commercial window of the Chilean market, which indicates that the export of melon is concentrated in the month of December.

Table 9. Seasonal index for the exported melon series (kg).

Periodo	Factor estacional (%)	Índice estacional
Ene	0	0
Feb	0	0
Mar	0	0
Abr	0	0
May	8.3	0.08
Jun	20.4	0.2
Jul	9.5	0.09
Ago	0	0
Set	5.8	0.06
Oct	171.6	1.72
Nov	285.6	2.86
Dic	698.9	6.99

6.8.2 Trend component for melon series.

For the long-term trend analysis, the simple extrapolation method was used, which is based on the development of a deterministic regression model of time series of a single equation, it was estimated by means of a linear regression model (equation 6), for which the smoothed trend cycle data series (STC_1), presented in Table 10, was used.

$$Y_t = \alpha + \beta t + \varepsilon_I \quad \textbf{Equation 6}$$

Table 10. Linear regression coefficients.

	Unstandardized coefficients		Standardized coefficients		
	B	Error	Beta	t	Sig.
Years	2,212.405	857.524	0.221	2.580	0.011
(Constant)	-4,439,333.677	1,726,198.191		-2.572	0.011

$$\mathbf{Yt = -4439333{,}677 + 2212{,}405(t) + \varepsilon_I} \quad \text{.....} \quad \textbf{(7)}$$

For the analysis of the monthly variation rate, the semi-logarithmic regression was used (equation 8).

$$\mathbf{LnY_t = \alpha + \beta_t + \varepsilon_i} \text{.....} \quad \textbf{8}$$

Table 1. Semi-logarithmic regression coefficients

	Unstandardized coefficients		Standardized coefficients		
	B	Error	Beta	t	Sig.
Years	0.319	0.117	0.233	2.731	0.007
(Constant)	-635.972	234.848		-2.708	0.008

$$\mathbf{LnY_t = -635.972 + 0.319\ (t) + \varepsilon\text{……..}} \quad \textbf{(9)}$$

Tables 10 and 11, represent the estimation coefficients of linear and semi-logarithmic trend for the monthly exports of melon from 2008 to 2018, the angular coefficients presented were significant (P<0.05), with the regression analysis of the equation it was possible to quantify the trend behavior of the export of melon, that is, the existence of an ascending pattern of trend for the series represented in Figure 6. From the data of the linear regression (equation 7), a growth of 2 212,405 kg of exported melon per period variation is observed.

Based on the estimation, semi-logarithmic of equation 9, it is evident a variation rate for the exported quantity of melon of 31.9% in the period, determining an annual growth in the exported quantity.

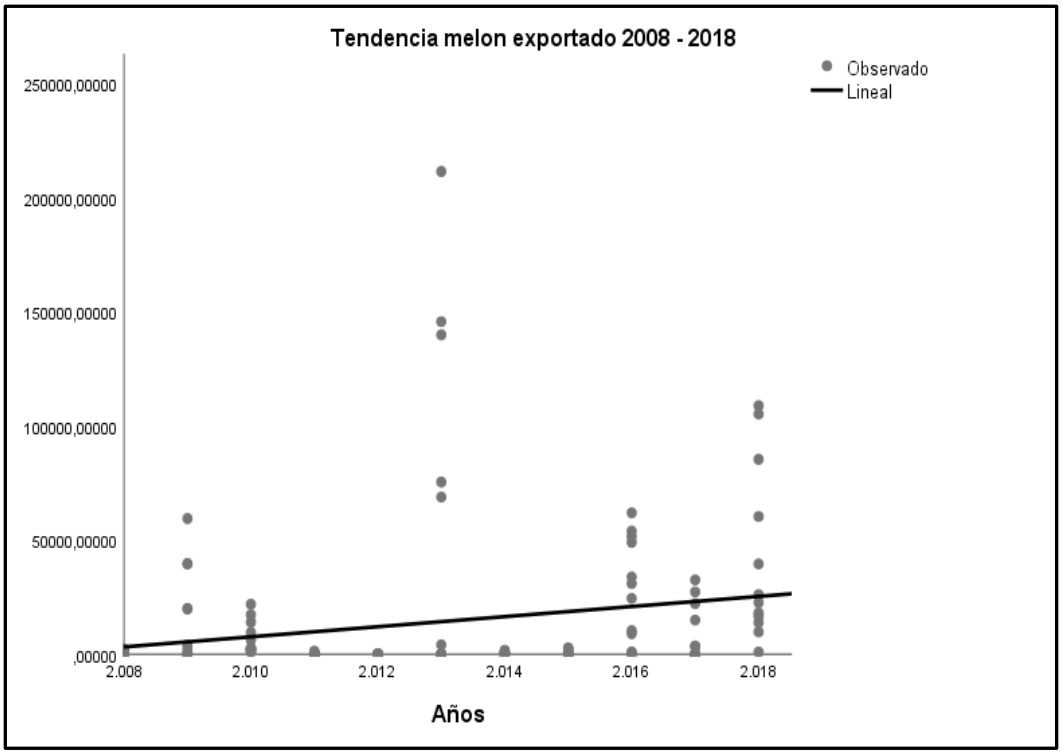

Figure 6. Trend graph for the melon quantity series 2008 - 2018.

6.8.3 Cyclic component

In a long-term perspective, Figure 7 shows the cyclical component of the exported quantity of melon, in its four phases, peak, contraction, depression and expansion. There is evidence of well-defined long-term fluctuations, from 2008 to 2015 maintains a moderate shortage,

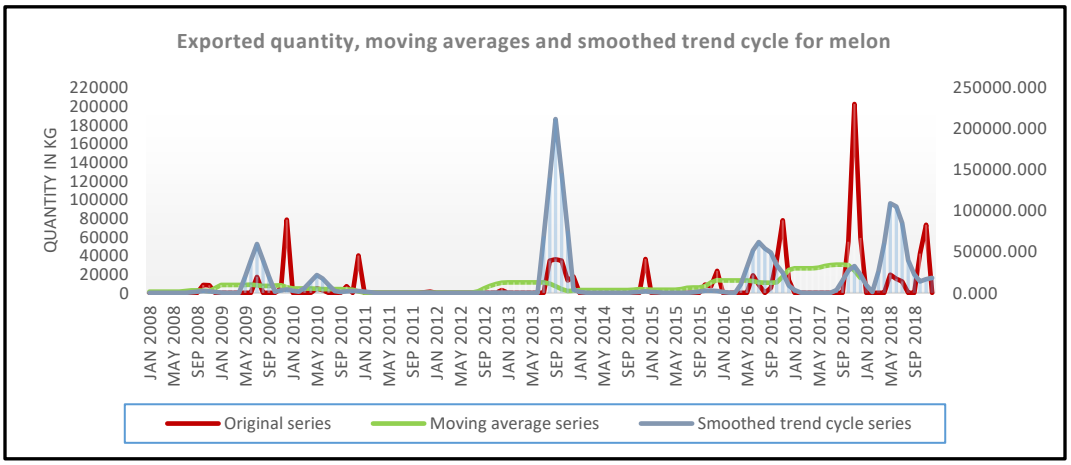

Figure 7. Cycle, trend (moving averages) and original series (kg) of exported melon.

The number of melons exported has been expanding since 2016 until the end of the period. Presenting the maximum exported quantity of the period in 2018 with 161 565 kilos of melon exported, through four

exporters, as evidenced by the processed DAMs.

7. Statistical test

7.1 Main hypothesis testing

The phytosanitary status significantly influences the exports of cucurbits from Tacna in the period 2001-2018.

a) Statement of the statistical hypothesis

H_0: Phytosanitary status does not significantly influence cucurbit exports from Tacna in the period: 2001-2018.

H_1: Phytosanitary status significantly influences cucurbit exports from Tacna in the period: 2001-2018.

b) Significance level: 0.05

For any probability value equal to or less than 0.05, H_0 is rejected.

c) Choice of statistical test: Mann-Whitney U.

Table 7. Mann-Whitney Test

Ranges

	PHYTOSANITARY STATUS	N	Average Range	Sum of ranks
WEIGHT GROSS IN KG	No phytosanitary status	62	1,198.66	7,4317.0
	With phytosanitary status	4,873	2,484.15	12,105,263.00
	Total	4,935		

Table 8. Test statistics

	GROSS WEIGHT IN KG
Mann-Whitney U test	72,364.00
W for Wilcoxon	74,317.00
Z	-7.083
Asymptotic sign(bilateral)	0.00

a. Grouping variable: PHYTOSANITARY STATUS.

d) Decision rule:

Reject H0 if the p-value is less than 0.05

Do not reject H0if the p-value is greater than 0.05.

Conclusion:

Since the p-value is less than 0.05 then the null hypothesis is rejected and it is concluded that the phytosanitary status significantly influences the exports of cucurbits from Tacna in the period: 2001-2018.

7.2 Testing the first secondary hypothesis.

The phytosanitary status significantly influences the exports of melon from Tacna in the period: 2001-2018.

a) Statement of the statistical hypothesis

H0: Phytosanitary status does not significantly influence melon exports from Tacna in the period: 2001-2018.

H1: Phytosanitary status significantly influences melon exports from Tacna in the period: 2001-2018.

b) Significance Level: 0.05

For any probability value equal to or less than 0.05, H0 is rejected.

c) Choice of statistical test: Mann-Whitney U test for melon export.

Table 9. Mann-Whitney test for melon export

Ranges

	PHYTOSANITARY STATUS	N	Average Range	Sum of ranks
WEIGHT GROSS IN KG	No phytosanitary status	20	99.53	1,990.50
	With phytosanitary status	132	73.01	9,637.50
	Total	152		

Table 10. Test statistics

	GROSS WEIGHT IN KG
Mann-Whitney U test	859.50
W for Wilcoxon	9,637.50
Z	-2.51
Asymptotic sign(bilateral)	0.012

a. Grouping variable: PHYTOSANITARY STATUS.

d) Decision rule:

Reject H0 if p-value is less than 0.05

Do not reject H0if the p-value is greater than 0.05.

Conclusion:

Since the p-value is less than 0.05 then the null hypothesis is rejected and it is concluded that the phytosanitary status significantly influences the exports of melon from Tacna in the period: 2001-2018.

7.3 Testing the second secondary hypothesis

Phytosanitary status significantly influences watermelon exports from Tacna in the period: 2001-2018.

a) Statement of the statistical hypothesis

H0: Phytosanitary status does not significantly influence watermelon exports from Tacna in the period: 2001-2018.
H1: Phytosanitary status significantly influences watermelon exports from Tacna in the period: 2001-2018.

b) Significance Level: 0.05
For any probability value equal to or less than 0.05, H0 is rejected.

c) Choice of statistical test: Mann Withney U test for watermelon export.

Table 11. Mann-Whitney test for watermelon export

Ranges

	PHYTOSANITARY STATUS	N	Average Range	Sum of ranks
WEIGHT GROSS IN KG	No phytosanitary status	42	834.45	35,047.00
	With phytosanitary status	3,413	1,739.00	5,935,193.00
	Total	3,455		

Mann-Whitney testwatermelon exports.

Table 12. Test statistics

	GROSS WEIGHT IN KG
Mann-Whitney U test	34,144.00
W for Wilcoxon	35,047.00
Z	-5.871
Asymptotic sign(bilateral)	0.00

a. Grouping variable: PHYTOSANITARY STATUS.

d) Decision rule:
Reject H0 if the p-value is less than 0.05
Do not reject H0if the p-value is greater than 0.05.

Conclusion:
Since the p-value is less than 0.05 then the null hypothesis is rejected and it is concluded that phytosanitary status significantly influences watermelon exports from Tacna in the period: 2001-2018.

7.4 Testing the third secondary hypothesis
The phytosanitary status significantly influences the exports of Zapallo from Tacna in the period: 2001-2018.

a) Statement of the statistical hypothesis
H0: Phytosanitary status does not significantly influence the exports of pumpkin from Tacna in the period: 2001-2018.
H_1: Phytosanitary status significantly influences the exports of Tacna squash in the period: 2001-2018.

b) Significance level: 0.5

For any probability value equal to or less than 0.05, H0 is rejected.

c) Choice of statistical test: U Mann Whitney for the export of pumpkin.

Table 13 Mann-Whitney test for pumpkin exports.

Ranges

	PHYTOSANITARY STATUS	N	Average Range	Sum of ranks
WEIGHT GROSS IN KG	No phytosanitary status	7	4.00	28.00
	With phytosanitary status	1,328	671.50	891,752.00
	Total	1,335		

Table 14. Test statistics

	GROSS WEIGHT IN KG
Mann-Whitney U test	000.00
W for Wilcoxon	28,000.00
Z	-4.574
Asymptotic sign(bilateral)	0.00

a. Grouping variable: PHYTOSANITARY STATUS.

d) Decision rule:

Reject H_0 if p-value is less than 0.05

Do not reject H_0 if the p-value is greater than 0.05.

Conclusion:

Since the p-value is less than 0.05 then the null hypothesis is rejected and it is concluded that the phytosanitary status significantly influences the exports of Tacna pumpkin in the period: 2001-2018.

8. Discussion of results

With the results it was shown that there is significant difference between the level of exports of cucurbits to the Chilean market in the period: 2001-2007 without phytosanitary status and period: 2008-2018 with phytosanitary status, according to the Mann Whitney U test, a p value of 0.00 was obtained less than the significance level which is 0.05. The results found agree in part with (Farfán, Palomino, & Ruiz, 2018) who, concluded that, demand conditions; export programs promoted by the government, market saturation, are external factors that influence exports.

The export of cucurbits in an activity that stands out in the Tacna commendation, agricultural exports are a representative sector that has comparative advantage, which enables export, in the Peruvian ranking the largest exporter of cucurbits is Tacna.

Two phases were identified in the study period, the first one characterized by insipient and not very dynamic export processes, delimited by the high prevalence of a pest of

world economic importance such as the fruit fly, phytosanitary status that limited agricultural exports. And the second phase, characterized by the recognition of the Tacna region, as an area free of fruit fly, phytosanitary status, which gives access to markets for agricultural exports. In developing countries, such as ours, agricultural exports, not only need to have access to markets, but also the ability to compete and to be able to protect themselves from harmful pests without limiting trade, it is a balance based on international criteria concerning plant health and phytosanitary regulations, as mentioned in accordance with the International Plant Protection Convention (FAO, 2015) and the Plant Protection Organizations (NPPOs).

The Peruvian State and its institutions started the fight against fruit flies (Ceratitis capitata and Anastrepha spp), in 1968 through SIPA (now INIA), the International Atomic Energy Agency; in 1984 implemented measures to combat the pest. In 1990 the Governments of Peru and Chile, through an agreement, established as an integrated area the Regions of Tacna and Moquegua in Peru and the Region of Arica in Chile. In 1997, the National Fruit Fly Program - PNMF (SENASA) was implemented in the Moquegua and Tacna Regions. In 1998, the IDB granted a loan for the eradication of fruit flies (SENASA, 2007). These actions have already transcended five governments, promoting the growth of the agro-export sector, moving from sectoral policies to state policies.

In view of this, the agricultural sector diversified production to grow more basic horticultural products of great value such as melon, watermelon and pumpkin, for export purposes, complying with the phytosanitary standards of countries free of the pest of fruit flies.

The results show that there is a significant difference between the level of exports of cucurbits to the Chilean market, in the first phase: 2000 - 2008 with a phytosanitary status characterized by high prevalence of fruit fly and the second phase: 2008 - 2018 with phytosanitary status free of the pest of fruit fly, according to the results of the Mann Whitney U test. The results found are contrary to what was established by (Diaz, 2016) who concluded that there is an export of Peruvian watermelon to the Chilean market in the period 2009 - 2015 that had a negative trend.

The results found partly resemble those reported by (Balcazar & Calva, Las exportaciones no tradicionales y su contribución al crecimiento económico de Tumbes, 1999-2014, 2017.), who conclude that there is a positive relationship between non-traditional exports and economic growth. However, this contribution is moderate. The first specific hypothesis has been confirmed, which indicates that the findings found resemble what was reported by (Paniagua, 2013), who concluded that the producer's participation in the price is only significant in the case of pumpkin (implying a value of 66%); however, for the case of melon and watermelon (in whose cases the producer's participation represents 26% and 35% respectively of the total marketing margin).

The findings detected are partly related to what was reported by (Ccama, 2016), who concludes that, Suite Amelia watermelon produced in Majes and Tacna is a new product to export to Chilean markets, being quoted in the destination country during October - February.

Another relevant element is the National Strategic Export Plan PENX 2003-2013, promoted by the Ministry of Foreign Trade and Tourism MINCETUR, which proposes four thematic areas: a) development of exportable supply, b) facilitation of foreign trade, c) development of destination markets and d) development of an export culture. Starting in 2011, the Foreign Trade Single Window (VUCE) will be implemented in order to improve the conditions of access to foreign markets, providing clear and predictable rules and disciplines for foreign trade.

9. Conclusions

The following are the conclusions reached after the diagnosis, analysis and interpretation of the results of the research work.

First

It has been determined that the phytosanitary status has a significant influence on exports of cucurbits from Tacna in the period: 2001-2018. Also, due to the declaration of the area free of fruit fly (phytosanitary status), there is a work plan (Work Plan for the export of cucurbits to Chile), which allows the constant monitoring of the phytosanitary status of exports of cucurbits, and with more enthusiasm, pumpkin producers have a great opportunity to export their products; quite apart from an exporting culture, to take advantage of trade agreements. And the existence of the implementation of the Single Window for Foreign Trade (VUCE), as a mechanism for modernization and simplification of export and import processes.

Second

It has been proven that the phytosanitary status significantly influences the exports of melon from Tacna in the period: 2001-2018, due to the declaration of the area free of fruit fly (phytosanitary status), and the modernization of foreign trade that allows reducing transaction costs and cross-border trade, ensuring safety, traceability and protection along the chain. The export of melon, for the second phase with phytosanitary status free of the pest of fruit flies, presents an increasing trend in the quantity exported, with the month of December having the highest seasonal index (6.99), in terms of cyclical behavior, the year 2018 is the one that presents the maximum amount of melon exported with 161 565 kilos, it is worth mentioning that melon is the product of lower export among cucurbits with a total exported 1 024 215 kilos.

Third

It has been determined that the phytosanitary status has a significant influence on watermelon exports from Tacna in the period: 2001-2018, also due to the declaration of the area free of fruit fly (phytosanitary status). The export of watermelon, for the second phase with phytosanitary status free of the pest of fruit flies, shows an increasing trend in the amount exported, being the months of November and December in which the largest number of exports is concentrated with seasonal indices of 4.04 and 4.13, as for the cyclical behavior, a percentage variation of 907% between the base year 2008 and 2018 was determined.

Fourth

It has been found that the phytosanitary status significantly influences the exports of pumpkin from Tacna in the period: 2001-2018, due to the declaration of the area free of fruit fly (phytosanitary status) that, to the trade policy, where it has been allowed that exporters can generate the trade agreements through the instruments of development of a diversified, competitive and sustainable exportable supply. The export of pumpkin, for the second phase with phytosanitary status free of the pest of fruit flies, shows an increasing trend in the amount exported, being the months of October and November in which the largest number of exports is concentrated with seasonal indices of 3.30 and 5.45, in terms of behavior.

10. Recommendations

The following are the recommendations that have been arrived at, after having obtained the conclusions of the research work.

It is suggested that there is a high technical commitment of the sectors related to foreign trade of cucurbits, to raise the level of cucurbit exports to the Chilean market.

It is suggested that the Regional Government coordinate with the responsible entities for the execution of the budget to promote exports to raise the level of exports of pumpkin to the Chilean market.

It is suggested to develop the monitoring of the implementation of public policies to support exports in order to increase watermelon exports to the Chilean market.

It is suggested that dissemination activities and joint work be carried out with the private sector with respect to trade policies in order to continue taking advantage of the opportunities arising from trade agreements.

References

1. APEC. (10 de julio de 2020). Foro de Cooperacion Economica de Adsia Pacifico. Obtenido de https://www.aduana.cl/foro-de-cooperacion-economica-de-asia-pacifico-apec/aduana/2007-02-28/103547.html

2. Arteaga, F. (2018). Patron Estacional de las exportaciones peruanas de la sandia hacia ecuador durante los años 2014-2017. Lima, Peú: Universidad Cesar Vallejo Facultad de Ciencias Empresariales Escuela Profesional de Negocios Internacionales.

3. Balcazar, J., & Calva, L. (2017). Las exportaciones no tradicionales y su contribución al crecimiento económico de Tumbes, 1999 - 2014. Tumbes, Tumbes: Universidad Nacional de Tumbes.

4. Balcazar, J., & Calva, L. (2017.). Las exportaciones no tradicionales y su contribución al crecimiento económico de Tumbes, 1999-2014. Tumbes, Perú: Universidad Nacional de Tumbes. Facultad de Ciencia Económicas.

5. Barreto, R., & Gonzales, F. (2016). La Agroexportacion y su influencia en el crecimiento economico del Perú, 1990 al 2015. Huaraz, Perú: Universidad Nacional Santiago Antunez de Mayolo.

6. Becerra, K., & Rabines, A. (2018). Analisis de la Oferta Exportable de Zapallo Loche de la Empresa HASS Perú S.A desde el distrito de Chao-La libertad hacia el mercado de Holanda. Trujillo, Perú: Universidad Privada del Norte.

7. Bello, J. (2010). Estudio sobre el impacto de las exportaciones en el crecimiento económico del Perú durante 1970 - 2010. Lima, Perú: Universidad Nacional Mayor de San Marcos Unidad de Post-grado.

8. BID, D. d.-W.-6. (2016). Estimando los Impactos de un Programa de Erradicacion de la Mosca de la Fruta en Peru un enfoque de regresión discontinua geográfica / Lina Salazar, Alessandro Maffioli, Julián Aramburu, Marcos Agurto. . Lima: Banco Interamericano de Desarollo.

9. Brito, C., & Moran, C. (2018). Analisis de las exportaciones de Sandia Ecuatoriana de la Zona 5y 8 hacia los mercador internacionales sustentables. Guayaquil, Ecuador: Univerdidad de Guayaquil Facultad de Ciencias Administrativas Carrera Ingenieria en Comercio Exterior.

10. Bunge, M. (1972). Teoria y Realidad. Barcelona, España: Ariel.

11. Calderon, A. (2016). Las barreras no arancelarioas como problematica para la exportacion de aciete de oliva de las MYPES formales de la region Tacna, 2015. Tacna, Perú: Universiad Privada de Tacna.

12. Campo, M., Rincón, L., Castaño, L., & Quintero, H. (2008). Los INCOTERMS y su uso en el comercio internacional. Bogotá, Colombia: Panamericana Formas e Impresos.

13. Castillo, S. (2014). El impacto de las exportaciones en el crecimiento

económico del Prú durante el período 2000 - 2010. Trujillo, Perú: Universidad Nacional de Trujillo. Facultad de Ciencias Económicas.

14. Ccama, E. (2016). Exportación de sandía Santa Amelia de origen peruano a Chile. Arequipa, Perú.: Universidad Alas Peruanas.

15. CEPAL. (2018). El comercio de America Latina y el Carive vuelve a crecer, pero se requeren politicas publicas activas para avanzar hacia una mayor diversificacion exportadora. Santiago de Chile: Comision Economica para America Latina y el Carive ISSN 2522-7424.

16. CEPAL(a). (2014). Agricultura familiar y circuitos cortos - Nuevos esquemas de produccion, comercializacion y nutricion. Santiago de Chile: Publicacion de las Naciones Unidas ISS 1680-9033LC/L.3824.

17. CIPF(a), C. i. (02 de 05 de 2006). NIMF N° 7 Sistema de Certificación para la exportación. Recuperado el 05 de 04 de 2020, de www.ippc.int>largefiles>ISPM_07_1997_Es

18. CIPF(b). (25 de 05 de 2020). Establecimiento de áreas libres de plagas para las moscas de la fruta (Tephritidae). Obtenido de Establecimiento de áreas libres de plagas para moscas de la ...: www.fao.org/3/a-k7557s.pdf

19. Corvalan, L. (2004). Evaluación del índice 0.01capturas/trampa/día como indicador de la baja prevalencia de Ceratitis Capitata (Wiedemann) en duraznos importados. Agricultura Técnica v.64 n.1.

20. COSAVE. (marzo de 2018). Lista de las principales plagas cuarentenarias para la región del COSAVE. Obtenido de www.cosave.org documentos oficiales

21. D.L.1059. (28 de 06 de 2008). Decreto Legislativo N° 1059 que aprueba la Ley General de Sanidad Agraria. Recuperado el 05 de 05 de 2020, de www.senasa.gob.pe>senasa

22. Daniels, J. R., & Sullivan, D. (2010). Negocios initernacionales. Ciudad de México, México.: Pearson Edicación de México S.A. de C.V.

23. Diaz, K. (2016). Exportación de sandia peruana al mercado chileno durante el periodo 2009 - 2015. Lima, Perú.: Universidad Cesar Vallejo.

24. DRAT, D. E. (04 de mayo de 2020). Agritacna.gob.pe. Obtenido de www.agritacna.gob.pe

25. DRTPET. ("s.f."). Diagnóstico socio económico laboral Tacna. Tacna, Perú: Dirección Regional de Trabajo y Promoción del Empleo - Tacna.

26. Esparza, C. (17 de 04 de 2,020). Series Temporales. Obtenido de Seires Temporales - CSIC: humanidades.cchs.csic.es

27. FAO. (2015). Datos sobre alimentacion y agricultura. FAO Datos sobre la alimentación y la agricultura, 17-18.

28. FAO. (24 de 05 de 2020). La lucha contra la mosca de la fruta no conce fronteras nacionales. Obtenido de La lucha contra la mosca de la fruta: http://www.fao.org/in-action/control-of-fruit-fly-does-not-stop-at-national-borders/es/

29. FAO-NIF.4. (noviembre de 2017). Requisitos para el establecimiento de áreas libres de plagas. Roma: Secretaria de la Convencion de

Porteccion Fitosanitaria. Obtenido de NIMF N° 4 Requisitos para el establecimiento....: www.cosave.org/sites/default/files/nimfs/d4d3200ea8b1484a791a74495ee8a755.pdf

30. FAO-NIMF.12. (2017). Certiticados Fitosanitarios. Roma: Secretaria de la Convnecion Internacional de Proteccion Fitosanitaria.

31. FAO-NIMF.12. (2017). Certificados fitosanitarios. Roma: Secretaria de la Convencion Internacional de Proteccion Fitosanitaria.

32. FAO-NIMF.2. (2019). Marco para el analsis de riesgo de plagas. Roma: Secretaria de la Convencion Internacional de Porteccion Fitosanitria.

33. FAO-NIMF.5. (2020). Glorsario de terminos fitosanitarios. Norma Internacional para medidas fitosanitarias. ROMA: Secretaria de la Convencion Internacional de Proteccion Fitosanitaria (CIPF).

34. FAO-NIMF.8. (2017). Determinacion de la situacuion de una plaga en un area . Roma: Secretaria de la Convencion Internacional de Proteccion Fitosanitria.

35. FAO-NIMF.9. (2017). Directrices para los programas de erradicacion de plagas. Roma: Secretaria de la Convencion Internacional de Proteccion Fitosanitria.

36. Farfán, S., Palomino, V., & Ruiz, F. (2018). Análisis de los factores que inciden en la exórtación de las MYPES del sector textil confecciones. Caso de estudio: Corporación STEALTH, NEVIH PLUS SIZE y Pijamas Rozze latina del emporio comewrcial de Gamarra. Lima, Perú.: Pontificia Universidad Católica del Perú. Facultad de Gestión y Alta Dirección.

37. Farfan, S., PalominoV., & Ruiz, F. (2018). Análisis de los factores que inciden en la exportación de las MYPES del sector textil confecciones. Casos de estudio: Corporación STEALTH, NEVIH Plus SZ y Pijamas Rozze latina del emporio comercial de Gamarra. Lima, Perú.: Pontificia Universidad Católica del Perú. Tesis de Grado.

38. Frohmann, A., Mulder, N., Olmos, X., & Urmeneta, R. (2016). Internacionalización de la PYMES: Innovación para exportar. Santiago de Chile: CEPAL.

39. Gonzales, C. (2004). La investigacion Basica. La investigación Ciencias Fisiológicas: Bioquímica, Biología moelcular. Scielo, 6.

40. Gonzales, N. (2010). Producción y exportación de derivados de Tara. Lima, Perú: Universidad de Ciencias Aplicadas. Escuela de Postgrado.

41. GRT. (2016). Plan de desarrollo regional concertado Tacna hacia el 2021. Tacna, Perú.: Gobierno Regional Tacna.

42. GRT. (2008). Plan estartégico regional del sector agrario de Tacna 2008-2015. Tacna, Perú: Gobierno Regional de Tacna, Dirección Regional Sectorial de Agricultura Tacna.

43. Hernández, R., Fernández, C., & Baptista, M. (2014). Metodología de la Investigación. México: McGraw Hill.

44. Herrera, J. (2012). Determinantes de las exportaciones no tradicionales en el Perú entre 2000 - 2010. Lima, Perú: Universidad San Martín de Porres.

45. Huaman, M. (2013). Comentarios a las innovaciones de las INCOTERMS 2010. Lex N° 12 , 26.

46. Huamán, M. (2014). Comentarios a las innovaciones de los INCOTERMS 2010. LEX Revista de la Facultad de Derecho Ciencias Políticas, 321-346.

47. INEI. (2018). Compendio estadistico. Lima: Instituto Nacional de Estadistica e Informtica.

48. Laquita, R. (2016). La gestion empresarial y su impacot en la exportacion de sanida (Citrullus lanatus) de las empresas de la region Tacna, año 2016. Tacna: Universdiad Nacional Jorge Basasdre Grohmann.

49. León, J. (2007). Determinantes del proceso de internacionalización de las PYMES peruanas: Caso Sector Confecciones. Lima, Perú.: Consorcio de Investigación Económico Social / Universidad Nacional de San Marcos.

50. Levin, R., & Rubin, D. (2,011). Estadística para administración y economía. México: Pearson Educación.

51. Levin, R., & Rubin, D. (2011). Estadística para administración y economía. México: Pearson Educación.

52. Martinez, C. (2014). Apoyo a la formalacion de lienamientos para la politica nacional agraria. Lima: Informe de Cosultoria para GIZ.

53. MINAGRI. (2015). Analis de tendencias quye impactan en la Agricultura. Lima: Comision Sectorial de Planeamiento Estrategico del Sector Agricultura y Riego.

54. MINCETUR. (18 de abril de 2020). PENX 2003-2013 MINCETUR. Obtenido de www.mincetur.gob.pe

55. MINCETUR(a). (23 de Junio de 2020). Promperú servios al exportador. Obtenido de www.acuerdoscomerciales.gob.pe/index.php?option=com_content&view=category&layot

56. MINCETUR-Tacna. (2018). PERX TACNA 2025 Plan Regional Exportador Tacna 2025. Lima, Perú: Ministerio de Comericio Exterior y Turismo - CD Plast SAC.

57. Ministerio.de.Agricultura.y.Riego. (2016). Politica Nacional Agraria. Lima: Biblioteca Nacional del Perú Nº 2016 - 05292.

58. Montoya, D., Gonzales, C., & Duarte, L. (2016). Situación y retos de Colombia en materia de comercio exterior, en el marco de la Alianza del Pacífico. Entramado, 50-65.

59. OMC. (26 de ABRIL de 2020). webmaster@wto.org. Obtenido de https://www.wto.org/spanish/tratop_s/sps_s/sps_s.htm

60. ONU , C. (2005). Recomendación N° 33 VUCE. Centro de las Naciones Unidad para Facilitacion del Comercio y las Transacciones Electronicas, (pág. 37). Obtenido de vuce.gub.uy Ventanilla_Recomendacion_33

61. ONU. (2011). Convención de la Naciones Unidas sobre los contratos de compra venta internacional de mercancías. Nueva York: Publicaciones y biblioteca, oficina de las Naciones Unidas.

62. Paniagua, D. (2013). Análisis del comportamiento de comercialización de cucurbitaceas en la región Tacna. Tacna, Perú.: Universidad Nacional Jorge Basadre Grohmann.

63. PromPerú. (2016). Guia de reqisitos de accceso de alimentos a Chile. Lima, Perú: Ministerio de Coemrcio Exterior y Turismo.

64. Ramírez, B. (2016). Análisis de los medios de pago mas utilizados en la exportación de productos hacia mercados extranjeros conel INCTERM FOB. Machala, Ecuador.: Universidad Técnica de Machala. Unidad Académica de Ciencias Empresariales.

65. Reyes, J. (2015). Exportaciones de productos tradicionales hacia Alemania con sus respectivos documentos de acompañamiento y declaración aduanera bajo el INCOTERM FOB. Machala, Ecuador.: Universidad Técnica de Machala. Unidad Acadpémica de Ciencias Empresariales.

66. Reyes, M. (2016). Principales Factoares que explican la evoluciion de las agroexportaciones peruanas; periodo 2010-2014. Trujillo, Peru: Universidad Nacional de Trujillo.

67. Sandoval, Y. (2018). Factores que influyen en el nivel de exportaciones de productos no tradicionales del Perú perido 2015-2018. Tacna: Universidad Privada de Tana.

68. Sbriglio, E. (2008). El Comercio Internacional: Manual práctico de clasificación y valoración de las mercaderias.

69. SENASA. (Noviembre de 2007). Normas legales MINAGRI. Obtenido de Normas legales/senasa.gob.pe: www.minagri.gob.pe resolucione directorales

70. SENASA(a). (27 de 11 de 2019). Mantenimiento de área libre de moscas de la fruta. Obtenido de senasa.gob.pe mantenimiento de área: www.senasa.gob.pe

71. SENASA(b). (2019). Sanidad Agraria. Lima: MINAGRI.

72. SENASA. (27 de 08 de 2020). Tacna: Exportaciones de productos agricolas superaron las... Obtenido de Tacna: Exportaciones de productos agrícolas superaron las 17 mil toneladas: https://www.google.com/search?sxsrf=ALeKk00FwXqZL8aly9inx_s18L9i1SLvUg%3A1598637167782&ei=b0RJX86hLD5OUP7sWfsAM&q=exportacion+de+producto+agicolas+de+tacna&oq=exportacion+de+producto+agicolas+de+tacna&gs_lcp=CgZwc3ktYWIQAzIICCEQFhAdEB4yCAghEBYQHRAeOgcII