

INPUT USAGE AND PROBLEMS IN GREEN BEAN PRODUCTION: A CASE OF BURDUR PROVINCE, TURKEY

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Abstract

The production of green beans increased by 6.5 times from 3,106 tons in 1991 to 20,199 tons in 2015 in Burdur. In this study, it was aimed to reveal the use of inputs and problems of farmers who produce green beans in Burdur province. The study was carried out in the central district of the province of Burdur, where the production of green beans was the most intensive. Stratified sampling method was applied and the number of samples according to this method was determined as 112 farmers. Data were obtained by the face-to-face survey method. Sales quantities of farmers in the region varied depending on the cultivation area and yield of green bean. It was found that the use of unit labour in the unit area was 251.72 MLU hours in the production of green beans. Machine power usage was calculated as 2.18 hours per decares. The amount of seed used was 8.20 kilograms. The most important criterion in the preference of green bean cultivation was the high possibility of irrigation and productivity in the region. Sale of green beans starts at the end of July and lasts until the 15th of September. The prices of green beans were largely determined by the companies. Farmers sell their products wholesaler-trader. It can be said that the cultivation of green bean cultivation will continue through the factors such as the suitability of climate conditions, irrigation opportunities in the region, high yields and inadequate supply. However, the presence of a single collection center for the sale of products in the region is perceived as a threat. It can be stated that the producer's activity in the market may be more prominent with the establishment of the producer association and the development of organizational awareness in green bean growers in the region.

Key words: green bean, input, labour, problems, Burdur, Turkey.

INTRODUCTION

Bean (*Phaseolus vulgaris* L.) is an important cultivar of the Leguminosae family, which has a very high nutritional value and is abundantly consumed throughout the world. Beans can be evaluated in various forms such as fresh vegetables, dried grains and canned foods (Bozoğlu, 1995). The bean plant, which originated in Central America, came to Anatolia 250 years ago and found a very wide spreading area (Şehirali, 1988).

In the world 1,543,335 hectares of area and 21,365,119 tons of fresh bean production was realized in 2013. According to the figures for 2013, the most important producer of green beans in the world is China with a share of 78%. Other important countries in the production of this product are Indonesia, Turkey, India, Thailand, Egypt, Spain and Italy (FAOSTAT, 2017). Turkey meets 3% of the world's bean production. According to the data of 2015, 640,836 tons of green beans were

produced in Turkey from 50,122 hectares. Parlak and Gül (2016) pointed out the changes in the green and dry bean market in the world and in Turkey. Parlak and Gül (2016) reported that the world green bean production rose 5 times with both in terms of green bean yield and planting area expansion, Turkey ranks sixth in the world's green beans production and sixth in yields.

In 1992, 535,950 decares of green bean cultivation area in Turkey decreased by 6% and it was realized as 501,218 numbered. In 1991, 436,000 tons of green bean production increased by 47% to 640,836 tons (Table 1). So while the fresh bean fields remained stable, production growth continued to increase due to increased yields.

Turkey's share in green bean harvested area is the highest in Samsun with a rate of 15.7%. Turkey has the highest share in fresh bean production with a rate of 18.52% in Samsun province. Samsun is followed by Tokat with 54,783 tons, Bursa with 53,890 tons, Antalya

with 50,582 tons, Izmir with 42,586 tons, Mersin with 31,771 tons and Burdur with 20,199 tons. When considering the change of fresh bean cultivation area compared to 2000 in provinces, the highest increase was in Burdur (1.86 times), İzmir (1.62 times) and Samsun (1.42 times) respectively.

Table 1. Development of green bean cultivation area and production in Turkey

Year	Harvest area (decare)	Harvest area index (1992 = 100)	Production (ton)	Production index (1991 = 100)
1991	-	-	436,000	100
1992	535,950	100	450,000	103
1993	522,690	98	440,000	101
1994	540,420	101	435,000	100
1995	556,720	104	460,000	106
1996	548,570	102	455,000	104
1997	537,520	100	450,000	103
1998	546,100	102	455,000	104
1999	558,990	104	471,000	108
2000	584,170	109	514,000	118
2001	571,870	107	490,000	112
2002	570,980	107	515,000	118
2003	575,670	107	545,000	125
2004	562,710	105	582,000	133
2005	560,500	105	555,000	127
2006	537,824	100	563,763	129
2007	519,813	97	519,968	119
2008	530,200	99	563,056	129
2009	535,172	100	603,653	138
2010	531,340	99	587,967	135
2011	528,931	99	614,948	141
2012	528,506	99	621,036	142
2013	506,619	95	632,301	145
2014	501,767	94	638,469	146
2015	501,218	94	640,836	147

Source: TÜİK, 2017

When the change in the production of green beans is compared with the year 2000, with a maximum increase of 4.27 times in the province of Burdur. Burdur was followed by Adana with 3.76 times increase, Bursa with 2.22 times increase and İzmir with 2.16 times increase and Tokat with 2.11 times increase.

The development of green bean harvest area and production in Burdur province is given in Table 2. When the harvest area of green beans in Burdur province is examined by years; the area of fresh bean harvest, which was 5,780 decare in 1992, increased by 85% in 2015 and reached 10,699.

Production increased by 6.5 times compared to 3,106 tons in 1991 and increased to 20,199 tons in 2015. The share of Burdur in Turkish production has increased in general from 1991

onwards. Burdur province received 0.71% of the green beans produced in Turkey in 1991 and this ratio increased to 3.15% in 2015.

Table 2. Development of green bean cultivation area and production in Burdur

Year	Harvest area (decare)	Harvest area index (1992 = 100)	Production (ton)	Production index (1991=100)	Production share in Turkey (%)
1991	-	-	3,106	100	0.71
1992	5,780	100	3,742	120	0.83
1993	5,820	101	4,100	132	0.93
1994	5,080	88	4,395	142	1.01
1995	5,230	90	4,275	138	0.93
1996	4,680	81	4,577	147	1.01
1997	5,000	87	4,315	139	0.96
1998	5,560	96	4,834	156	1.06
1999	4,850	84	4,574	147	0.97
2000	5,740	99	4,732	152	0.92
2001	5,280	91	5,158	166	1.05
2002	4,980	86	4,605	148	0.89
2003	5,450	94	5,360	173	0.98
2004	5,030	87	5,686	183	0.98
2005	4,940	85	7,966	256	1.44
2006	5,012	87	9,266	298	1.64
2007	4,706	81	4,907	158	0.94
2008	8,939	155	11,489	370	2.04
2009	10,344	179	17,313	557	2.87
2010	10,609	184	19,276	621	3.28
2011	11,855	205	21,213	683	3.45
2012	11,713	203	21,068	678	3.39
2013	11,968	207	21,708	699	3.43
2014	11,114	192	20,208	651	3.17
2015	10,699	185	20,199	650	3.15

Source: TÜİK, 2017

When the harvest area of green beans was examined in the Burdur, the highest increase was realized in the Central district with an increase of 9.83 times. According to the year 2000, the production of green beans in Burdur was also realized in the Central district with a maximum of 54 times. The share of central province in Burdur production is 80.20% and it is in the first place.

Green beans in Turkey constitute 5.2% of vegetable production value and 1.4% of total plant production value with 1.3 billion TL production value in 2014. Turkey appears to be self-sufficient in the production of green beans. However, improvements in politics are important at the point of development of production.

As the research area, Burdur province was selected as the highest increase in harvest area and in production of green bean in Turkey

between 1991 and 2015. In Burdur, the production of green beans increased by 6.5 times from 1991 to 31,099 tons, reaching 20,199 tons in 2015. The aims of this study at this point were: (i) to examine the input use of green bean producing farms in Burdur, (ii) marketing activities, (iii) identifying problems and suggesting solutions.

Studies on the technical aspects of green bean production in Turkey have been made. The number of studies examining the production of green beans economically is limited. For this reason, the findings that would be obtained are thought to be useful to the farmers, researchers and related institutions working on the subject.

MATERIALS AND METHODS

Material

The main material of this study was obtained from the farmers who grown green beans in Burdur province. Secondary data related to the study were obtained from FAO, TUIK, Provincial and District Food, Agriculture and Livestock Departments. The data used in the research belonged to the production period of 2016.

Methods

Sampling Method

Sample volume was calculated as 112 farmers using Neyman stratified sampling method with considering 95% confidence interval and 5% error margin. Farmers in the production of green beans were divided into four groups according to their frequency distribution (first layer was 1.00-3.99 decares of green bean cultivation area, second layer was 4.00-7.99 decares green bean cultivation area, third layer was 8.00-15.99 decares of green bean planting area, layer 4 referred to 16.00 decares and above the green bean planting area).

According to this; there was interviewed with 24 farmers from the first layer, 13 from the second layer, 20 from the third and 55 farmers from the fourth layer. Farmers were selected randomly.

Method to use in obtaining data

The data needed for the analysis were obtained by face-to-face surveys of green bean farmers in Burdur. The questionnaire included the following questions: (i) age of the farmer,

education level, experience, cooperative membership, agriculture and non-agricultural income, (ii) population and family labour force, (iii) non-family labour force status, (iv) land-saving structure, (v) green bean marketing, (vi) support from the state of green bean producers, (vii) information on the amount of credit and credit utilization, and (viii) problems with green bean growing.

Evaluation of data

The data collected from the identified farmers were transferred to the computer, calculations were made and tables were created and these tables were interpreted using absolute and relative distributions.



Figure 1. Research area

RESULTS AND DISCUSSIONS

As a result of the farmer-level survey, 21.4% of the green bean producers interviewed were in the first group, 11.6% in the second group, 17.9% in the third group and 49.1% in the fourth group (Table 3).

Table 3. Distribution of green bean producers interviewed

Farmer width groups	Frequency (N)	Rate (%)
I (1.00-3.99 decares)	24	21.4
II (4.00-7.99 decares)	13	11.6
III (8.00-15.99 decares)	20	17.9
IV (16.00 decares and more)	55	49.1
Total	112	100.0

1 decare equal 0.1 hectares

Socio-economic indicators of farmers producing green beans in the study area were given in Table 4. The average age of farmers producing green beans in the region was 42.57 years. Educational levels of farmers were 5.46 years. The education level of the first group farmers was 5.13 years, the second group was 5.23 years, the third group was 5.30 years and

the fourth group was 5.71 years. Therefore, the education level of the farmers was above the elementary school level and it was close to the average level of education in Turkey. The household size of the green bean producers in the region was 4.22 persons. This value is 3 persons for Burdur province (TUIK, 2017). Therefore, the household size of green bean producers was above the value of Burdur province.

In the farmers' group interviewed, the fourth group had the highest number of experiments in plant production with 16.33 years. The first group of farmers had been dealing with green bean agriculture for about 14 years. The second group farmers were dealing with green bean production for about 10 years, the third group farmers about 6 years, and the fourth group farmers for about 13 years. The farmers average more than 11 years of experience in green bean growing. The 54.46% of the farmers stated that they keep records about the production of green beans. However, this record was in an unregulated system. Therefore, the record keeping in farmers was low. As a consequence, farmers were less likely to be able to follow developments related to green bean production activities and to plan and to see their net profits.

In the surveyed farmer groups, the fourth group with 30.91% was the most engaged in non-agricultural work. This value was 17.86% in farmers' average.

Therefore, the agricultural activity in the income of the interviewed farmers had a significant share. It was important to produce green beans so that they could continue their lives.

When some of the ownership indicators of the farmers are examined; Computer ownership was found to be as low as 10.71%. As a matter of fact, this rate was 22.9% in Turkey.

Internet ownership was also in the fourth group of farmers with only 3.64%. In Turkey, the internet access rate was 76.3% and the internet access rate was 93.7% on an individual basis (TUIK, 2017).

About 99.11% of the farmers in the area had ownership of mobile phone, 55.36% of them owned the car, and 63.39% owned the credit card.

The 66.07% of green bean growers were borrowed. The highest indebtedness was in the first and fourth group of farmers. Survey ownership of social security was high. This assurance was in 100% of the first, second, third group farmers and 87.27% of the fourth group farmers.

Table 4. Some socio-economic indicators in the production of green beans

Features	Farm groups				Average
	I	II	III	IV	
Farmer age (years)	45.54	57.23	37.75	39.56	42.57
Farmers' education level (year)	5.13	5.23	5.30	5.71	5.46
Household size (person)	3.75	3.85	3.50	4.78	4.22
Farmer's experience in plant production (years)	15.21	12.23	11.10	16.33	14.68
Farmer's experience in green bean production (years)	13.67	9.69	6.35	12.09	11.13
Farmer keeping records of operation (%)	45.83	76.92	25.00	70.91	58.04
Doing non-agricultural business (%)	4.17	0.00	10.00	30.91	17.86
Ownership of computers (%)	0.00	7.69	5.00	18.18	10.71
Internet ownership rate (%)	0.00	0.00	0.00	3.64	1.79
Ownership of mobile phones (%)	100.00	100.00	95.00	100.00	99.11
Ownership rate of cars (%)	95.83	15.38	25.00	58.18	55.36
Credit card ownership rate (%)	54.17	92.31	90.00	50.91	63.39
Debt rate (%)	100.00	23.08	25.00	76.36	66.07
With social security (%)	100.00	100.00	100.00	87.27	93.75
Ratio of farmers engaged in livestock (%)	0.00	7.69	90.00	25.45	29.46
Own land (%)	100.00	100.00	85.71	62.90	68.72
Rented land (%)	0.00	0.00	14.29	37.10	31.28
Agricultural membership (%)	70.83	69.23	55.00	67.27	66.07
Credit users (%)	4.17	7.69	15.00	7.27	8.04
A tendency to continue to produce green beans *	4.54	4.54	4.70	4.29	4.45
Knowledge of green beans **	3.79	3.23	3.20	4.25	3.85
Satisfaction with green bean production **	3.00	4.23	3.50	3.31	3.38

*: 1 = Absolutely not thinking; 2 = Does not think; 3 = Undecided; 4 = Thinking; 5 = Definitely thinking

** : 1 = Very low; 2 = Low; 3 = Medium; 4 = High; 5 = Very high

It was the third group with 90% of the farmer groups engaged in livestock. These were usually dairy cattle breeding. The first group of farmers did not have livestock production activity.

The 68.72% of the total land of farmers producing green beans was owned and 31.28% was rented. The green bean area was increased with the rental land ratio was increased.

When producers were investigating their tendency to continue to produce green beans; it was determined that the farmers thought to continue. The tendency to continue was stronger in the first, second and third group farmers. Farmers' knowledge of green bean production was also generally high. The level of knowledge was higher in the fourth group of farmers. The level of satisfaction with the production of green beans was moderate. The highest level of satisfaction with green bean production was found in the second group of farmers (Table 4).

The 4.17% of the first group farms, 7.69% of the second group farms, 15.00% of the third group farms and 7.27% of the fourth group farms were using agricultural credit. In the region average 8.04% of the farmers who produce green beans used the loan. Therefore, the use of credit in farms that produce green beans was low (Table 4).

It was found that 66.07% of the farmers were members of any agricultural organization. These organizations were Agriculture Chamber, Agricultural Credit Cooperative, Pankobirlik and Breeding Cattle Breeders' Union (Table 4). Soil processing in the production of green beans takes place in April. About 47.32% of the farmers carried out this process with their equipment. Green bean planting usually takes place in May (86.61%). The vast majority of the farmers were renting machinery (76.79%) during sowing. Drip irrigation method was used as irrigation method. Irrigation was carried out in May-August period. Animal manure was used by 88.39% of farmers. Leaf fertilization was done by 97.32% of the farmers.

In the production of green beans, the amount of seeds used during the sowing was examined. The first group used 8.86 kg per decare, 7.29 kg for the second group of farmers, and 7.90 kg for the third group of farmers and 8.26 kg of seeds were used in the fourth group. The highest seed usage per decare was in the first group (8.86 kg per decare) (Table 5). In green bean growing, 7-10 kg of seeds are recommended for use in sowing (MEGEP,

2008). Therefore, the amount of seed used in the research area was within the recommended limits.

Table 5 also showed the cost of seedlings of green bean producers. The farmers in the first group had higher seed costs (357.08 TL per decare). It was determined that the average cost of seedlings was 326.30 TRL per decare.

Table 5. Green bean seeds amount used of the farmers

Farmer width groups	Seed amount (kg per decare)	Seed cost (TRL per decare)
I	8.86	357.08
II	7.29	287.85
III	7.90	316.80
IV	8.26	325.42
Total/average	8.20	326.30

1 Euro equal 3.343611 TRL (Turkish Liras)

The 41.7% of the farms producing green beans in the region used their machine power in production. About 58.93% of the farmers provided the machine power by renting for the production of green beans. While 92.31% of the second group of farmers used their own machine power, 80% of the third group farmers had used the machine power by renting (Table 6).

Table 6. Machinery renting of the farmers

Farmer width groups	Owned (%)	Rented (%)
I	25.00	75.00
II	92.31	7.69
III	20.00	80.00
IV	43.64	56.36
Total/average	41.07	58.93

It was found that the green bean growers at the study site used and preferred their inputs according to their own knowledge and experience. The opinions of the dealers were also "absolutely important" in green bean farming. It was determined that farmers' neighbours and relatives and the technical staff in the Provincial Directorate of Agriculture opinions on the input used was also partially complied. Written sources were the least used information source (Table 7).

Labour employed in the green bean production was calculated in unit of male labour unit (MLU: Male labour unit. Here, male aged 15-49 was taken as =1, female aged 15-49 was taken as =0.75, male aged >50 was taken as=0.75, female aged>50 was taken as 0.50 and

child aged 7-14 was taken as =0.50 male labour unit) (Erkuş et al., 1995).

Labour force (MLU as hours) and machine power used in the production of green beans were shown in Table 8.

In the first group of farmers, the use of the family labour force per decares (351.44 MLU hours) was higher than the other groups. The fourth group farmers (199.43 hours) used more non-family labour than the other groups of farmers.

Table 7. Importance of information sources on the input used

Information sources	Farm width groups*				Average
	I	II	III	IV	
According to your own knowledge and experience	4.5	5.0	4.2	4.5	4.5
Dealer recommendations	4.5	5.0	4.1	4.5	4.5
Recommendations of technical staff in Provincial Directorate of Agriculture	3.9	4.2	2.0	2.7	3.0
Neighbours and relatives recommendation	3.3	2.5	1.8	2.8	2.7
Buyer recommendation (trader)	3.1	1.2	1.9	2.6	2.4
Books, magazines, newspapers, brochures, etc.	2.0	4.1	1.8	1.3	1.9

*: Likert Scale: 1 = Definitely no; 2 = No; 3 = Partially; 4 = Yes; 5 = Absolutely yes

As the amount of green bean land increased, the amount of non-family labour force increased accordingly.

As the area of green beans planting in the same way decreased, the use of family labour increased and the use of non-family labour decreased.

In Burdur province, the average labour used for the production of fresh beans was calculated as 251.72 MLU hours. Again in this direction, it was determined that the fourth group (2.00 hours) used the least amount of machine power. The fourth and third group farmers was near the collection center which is the market for green beans, so they used less machine power and also transport cost was less than the other farmers.

In the average farmers, the use of machinery in green bean production was calculated as 2.18 hours (Table 8).

Figure 2 showed the SWOT analysis results of the green bean production. This analysis of the sector was carried out using information obtained from 112 producers, brokers, traders, authorizing firms and relevant experts.

Table 8. Usage of labour and machine power in the green beans production

	Farm width groups*				Average
	I	II	III	IV	
Family labour force (hours per decares) (MLU)	287.74	134.76	47.39	57.21	68.19
Non-family labour force (hours per decares) (MLU)	63.70	100.60	147.22	199.43	183.54
Total labour force (hours per decares) (MLU)	351.44	235.36	194.61	256.64	251.72
Machine power usage (hour per decares)	3.57	4.26	2.25	2.00	2.18
Family labour force (%)	81.88	57.26	24.35	22.29	27.09
Non-family labour force (%)	18.12	42.74	75.65	77.71	72.91
Total labour force (%)	100.00	100.00	100.00	100.00	100.00

MLU: Man Labour Day--hours

The strongest aspects of fresh bean production in the region were that the climate of the research area is appropriate, the yield is high compared to other crops, the water required for green bean production is found and the product is easy to sell.

The lack of knowledge of green bean production, high labour use, labour cost, inability to find a market for the product in some cases and lack of producer cooperatives were the weaknesses of green bean production.

Opportunities in the green bean production in the region where the work is done can be defined as provide employment for the people, an important source of income, and the sale in cash.

The increase in the number of producers in the region, the inability to obtain fraud/sales amounts, the climate change, the lack of support/inadequacy were expressed as threats to the green beans production (Figure 2).

Problems in the green bean production

Problems related to production, marketing and financing (credit) in the research area were also examined. It was determined that the most problem was related to marketing and production. There was no problem with credit in the region. Problems related to production and marketing were listed below.

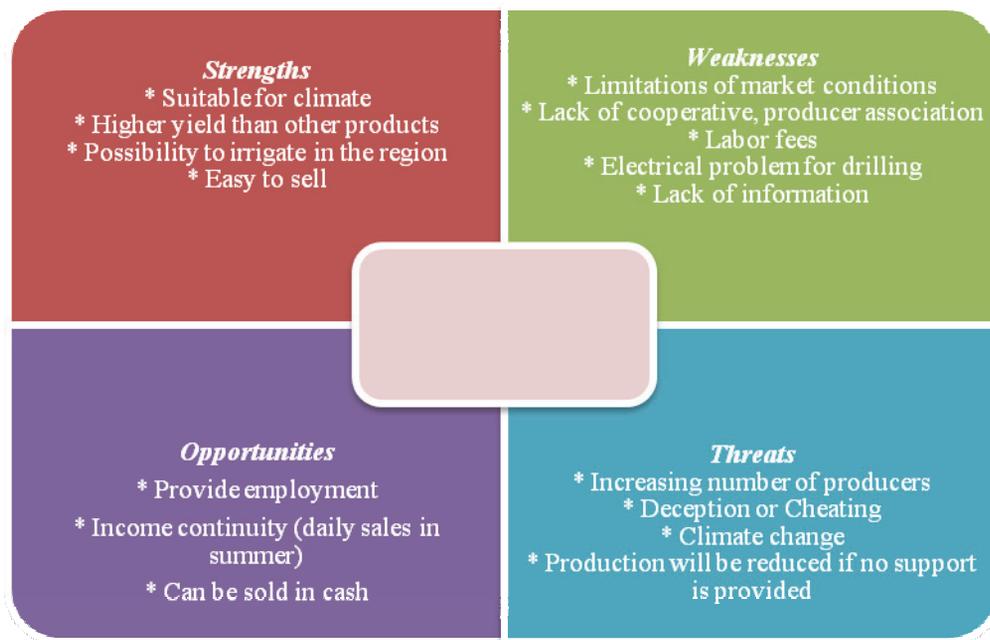


Figure 2. SWOT analysis of green bean production

Problems with production:

- Bourgondia seed which is a widely used green bean variety in the region, is expensive,
- Lack of information about the producers' struggle against disease and harmfulness,
- The lack of information on the green bean cultivation and sometimes the hail reduces crop yield,
- The fact that producers cannot get electricity subscription to the drilling wells used in the irrigation,
- The inputs used in production are expensive,
- The lack of consultancy and agricultural extension activities in the region.

Problems with marketing:

- The price of green beans is low and the price is unstable,
- They cannot get the money (deceit) after the farmers sold on account their products to merchants
- At the time of sale, the number of buyers in the collection center is low,
- The determination of the price of green beans by mutual agreement among traders,
- When a village outside the collection center, traders lower the price.

CONCLUSIONS

The average age of farmers interviewed in the region was 42.57 years. The household size was 4.22 persons. The farmers' experience in

producing green beans was 11.13 years. The 68.72% of the land was own land. Farmers generally rented land for the production of green beans.

Fresh bean producers were using their own knowledge and experience to supply the inputs they used. The views of agricultural chemical dealers were also "absolutely important" in green bean growing. One of the most important contributions of green bean growing is the used labour force. Green bean provides employment for over 30 days in one production season per decare. Small-scale enterprises were able to evaluate more of the family workforce. The need for non-family labour is increase with the scale of planted area.

The 8.20 kilograms of seed were used in the region. The maximum used of seeds was in the first group of farmers (8.86 kg) and the second group of farmers (7.90 kg) was the least seeded.

The majority of the interviewed farmers were the only green bean source of livelihood. Therefore, the low price of fresh beans, instability is one of the most important problems.

According to the information obtained, some farmers' green beans production were the sole source of income. Therefore, it is important to establish a cooperative or producer association for green beans in the region. The

fact that the producers go to such a structure against the instability and the low price of the product, which is the most important problem in the region, can provide improvement in this case. It can be stated that the organization of producers in the region as a cooperative or producer association is important in terms of price stability.

It is also important to disseminate consultancy and agricultural extension services in the region. Thus, the yield of the unit area can be increased.

Burdur Governorship or Burdur Municipality may be more effective in promoting/announcing the product. Advertising at various fairs and exhibitions can be a positive on green bean producer/production and therefore positive results for Burdur.

Improvements in input prices used in the green bean production can increase income by the farmer.

Improvement of the collection center located in the district can provide more participations of buyers and sellers in this market.

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