YYÜ TAR BİL DERG
(YYU J AGR SCI)
2017, 27(1): 51-57

Geliş Tarihi (Received): 18.11.2016
Kabul Tarihi (Accepted): 19.03.2017

Araştırma Makalesi/*Research Article (Original Paper)*

Evaluation of Farming Legumes in United States of America

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Abstract: Present research was conducted to do an evaluation of pulse growing in the United States of America that the country is a good model of pulse production besides powerful agricultural economy and to try finding issues and supporting to increase in the pulse production for better economic development in Turkey that has high potential. Survey questions were gathered between 2011 and 2015 in 10 States of USA under 32 items by reporting the answers of totally 300 farmers. Results showed that, the managed areas are relatively bigger and number of employers is not much because of using new technologies. Growers have close collaborations with universities. Certified seed using is rare while rotation, crop insurance, inoculation of bacteria and soil analyze is applied extensively. Pulse growers are suffering from insect, anthracnose and rust. Farmers usually have on-farm storage and they can sell products easily. Main aspects of farmers are disease-insect control, fertilization, yield stability and weed control, respectively. Consequently, there is need to lower inputs and well planned production for permanence in prices, government supports, using modern growing techniques integrated with industry beside expansion of production-deliver chain, increasing the utilization diversify as fresh or dry, standardization and better relations between customers and suppliers by consider human welfare, economic development and sustainability in agriculture.

Keywords: Agricultural economy, Farmer perception, Grower problems, Marketing, Pulse growing, USA

Amerika Birleşik Devletleri'nde Baklagil Tarımının Değerlendirilmesi

Özet: Bu araştırma, baklagil üretiminde iyi bir model olmasının yanı sıra güçlü tarımsal ekonomiye sahip olan Amerika Birleşik Devletleri'nde baklagil yetiştiriciliğinin değerlendirilmesi ve potansiyeli yüksek olan Türkiye'de ekonomik gelişmeye katkıda bulunabilmek adına baklagil üretiminin artırılmasına yönelik yapılabileceklerin bulunması amacıyla gerçekleştirilmiştir. Anket soruları, 2011 ile 2015 yılları arasında ABD'nin 10 farklı eyaletinde toplam 300 çiftçi ile gerçekleştirilmiş olup, 32 başlık altında özetlenmiştir. Araştırma sonuçlarına göre, üretim yapılan araziler oldukça büyük iken yeni teknolojilerin kullanılması nedeniyle çalışan sayısının oldukça sınırlı olduğu ortaya çıkmıştır. Yetiştiriciler, üniversiteler ile yakın temas halindedir. Sertifikalı tohumluk kullanımı düşük olup, münavebe, sigorta, bakteri aşılaması ve toprak analizinin yaygın olarak gerçekleştirildiği belirlenmiştir. Baklagil yetiştiricilerinin sıkıntı çektiği önemli konular arasında böcek, antraknoz ve küf sayılabilir. Üreticilerin büyük bir kısmı çiftlik üzerinde depolama tesisine sahip olduklarını ve ürünlerini kolaylıkla satabildiklerini ifade etmişlerdir. Yetiştiricilerin konuyla ilgili paydaşlardan beklentileri sırasıyla; hastalık-zararlı kontrolü, gübreleme, verim stabilitesi ve yabancı ot kontrolü olarak ifade edilmiştir. Sonuç olarak, tarımsal anlamda insan refahı, ekonomik gelişme ve sürdürülebilirliğin sağlanabilmesi için; girdi maliyetlerinin azaltılması ve iyi planlama yapılmış üretim ile fiyat istikrarının sağlanması, hükümet destekleri, yeni yetiştirme teknikleri ile endüstrinin entegre edilmesi ve üretim-taşıma zincirinin yaygınlaştırılması, taze ve kuru tane tüketimde çeşitliliğin artırılması, standardizasyon ve üretici-tüketici arasındaki bağlantının iyileştirilmesi gibi temel unsurlar hususlarında iyileştirilmeye ihtiyaç duyulmaktadır.

Anahtar kelimeler: Tarımsal ekonomi, Çiftçi algısı, Yetiştirici problemleri, Pazarlama, Baklagil tarımı, ABD

Introduction

Agriculture is one of the most important inputs in the United States economy. For a well planning in long-term, human should concern on sustainable agricultural systems to provide financial strength. Field crops

play an important role in the farming systems and in the nutrition of both human and animal around the world. Cereals and legumes are the two most important plants used in agriculture and these two families are the most important flowering plants over the world. Legumes belong to the family *Leguminosae* which also called as *Fabaceae* consist of 750 genera and 19 000 species. Human have been growing the legumes for 6000 years to use in human nutrition, animal nutrition, timber, dyes, tannins, resins, gums, insecticides, medicines and fibers. Today, less than 20 of legume species are grown extensively that including alfalfa (luceme), clover, mung bean, peanut, pigeon pea, soybean, vetch and the widely called as pulses; chickpea, cowpea, faba bean**,** kidney bean (also called as common or dry bean), lentil and pea. The word of "pulse" is originated from the Latin word "*puls*" means that pottage, namely seeds boiled to make porridge or thick soup (Akibode and Maredia 2011).

Globally, average yields of cereal crops are 3540 kg ha^{-1}, grown on 700 million ha area while pulses have 860 kg ha^{-1} yield and grown on 100 million ha area. Additionally, 70% of area harvested under all pulses falls under low-input rainfed systems compared to only 30% for cereal by view of worldwide. For whole of the developed regions, amount of irrigated and rainfed-high input systems is higher for cereals than for pulses. Food menu are changing globally and the part of non-cereal foods in the total calorie and protein consumption is increasing. This situation should be regulated by a balanced consumption of foods especially using of pulses which are a rich, cheap, easy transportable, long shelf life source of protein, amino acid, dietary fiber, minerals and small amounts of oil while a good complementary of cereals in rotation, reducing soil pathogens, supplying nitrogen, soil reformative, considered as secondary crops in most countries, ideal crops as reported by CGIAR; reducing poverty and hunger, improving human health and nutrition, and enhancing ecosystem life and as reported by FAO; "nes: not elsewhere specified". Additionally, FAO reports show that, pulses (except for broad bean) are grown on 64 814 937 ha area by 57 890 838 tons of production in the world while these quantities are 1 095 890 ha area by 2 233 219 tons of production in USA. Trade quantities of pulses (except for cowpea) in the world is 11 258 551 tons and $8 276 560 000 for import, while these are 283 410 tons (almost 1/40 of World) and $297 698 000 (almost 1/28 of World) for USA. Additionally, export is 12 137 047 tons and $7 928 152 000 for World which 947 412 tons and $639 065 000 (almost 1/12 of World) for USA.

As it reported by a related research (Janzen et al. 2006), production of pulses in United States is limited to the Pacific Northwest and the northern Plains states. Pea and lentil production in the United States is centered in the Palouse region of the Pacific Northwest (Washington, Oregon, Idaho) while it enlarged into the northern Plains (North Dakota and Montana). North Dakota has good conditions for growing the pulses. Therefore, pulses are a growing factor in North Dakota agriculture. As producers seek ways to plant diversify and improve the gain, alternative crops are supposing a greater role. Pulses are one of the recent success stories in USA, with fast wide spread in the last few years. By 2009, North Dakota had become the largest producer of pulse crops in USA according to "USA Dry Pea and Lentil Council" reports. The lower production and yield of pulse crops compared to cereals is reversed by view of the producer prices. Producing price of pulse crops showed a dramatic increase in the last few years in most of the important pulse producer countries of the world. This gave rise to both by shortage of supply (compared to demand) and rising costs based on the global fact of food and oil crisis in recent years. In the last decade, production of pulses has been expanded into the northern Plains (North Dakota and Montana) of United States due to suitable agronomic conditions and seeking ways of farmers to increase the production diversity and gain. Furthermore, growing of pulses should be increased by government supports over the world owing to their essential roles in sustainable food production systems for human health (Kahraman 2017) and soil improvement characteristics for sustainable agricultural systems that are contribute to national economy of the countries, mainly.

Legumes have big importance over the world due to many advantages that may be summarized by anti-oxidant activities, rich content of some vitamins in addition to the mentioned features above which make them as an essential crop in rotation for sustainability of human health, economy and agriculture concepts. Turkey is one of the origins of legumes for chickpea, lentil, pea and faba bean where has optimum growing conditions while some of the main growing problems cause to decrease in production and remarkable costs for imports. Due to the mentioned conditions in pulse production, the present research was made to see the situation of pulse growing in the United States economy which can be a good sample of pulse trade and the research was also conducted with the aims of giving suggestions about enhanced pulse production over the world to provide sustainability in agriculture and finance.

Materials and Methods

This research was made between 2011-2015 years in 10 States (California, Idaho, Minnesota, Montana, Nebraska, North Dakota, Oregon, South Dakota, Washington, Wyoming) of USA which have suitable environment conditions for agronomic production and showing an increased tendency for pulse growing besides North Dakota had become the largest producer of pulse crops in USA by 2009 as it implicated by "USA Dry Pea and Lentil Council" reports.

In the study, production quantity, growing conditions, time limit, cost etc. features were taken into account and the 10 states were randomly chosen. Legume growers in these states formed the population. Number of samples for representation of the population was determined according to the "convenience sampling method" which is one of the non-randomized sampling methods. This method provides ease and low cost for data collection and, used in festivals, field days, fair etc. activities (Şenol 2012).

A total of randomly selected 300 pulse growers who manage relatively wide areas were subjected to production survey questions by face to face and using web which were summarized by 32 questions (**Q**) as it seen in "**Results**" part of the manuscript. All of the questions were determined by view of multiple evaluations of pulse growers in terms of all the levels of pulse production, storage and marketing. All of the numerical data analyses were made by calculating the ratios (%) of the investigated data.

Results

Results of the present study are summarized under 32 questions and answers as it seen in the following line.

Question (Q)1- How many years have you been farming: 13.33% (<5 and 5-20) to 36.66 (30-40 and > 40)
Q2- How many hectare do you farm or manage: 13.33% (0-60 ha) – 26.66% (60-80 ha) – 26.66% (80-100 ha) - 33.35 (>100 ha)
Q3- Do you have employers: Yes (46.67%) – No (53.33)
Q4- Number of full-time employer: 40% (<2) – 60% (3)
Q5- Number of part-time employer: 40% (<2) – 40% (3) – 20% (4)
Q6- Where do you get agricultural information: 6.67% (company, press) – 13.33% (other: farmer, web, experience) - 20% (meeting, extension center) - 33.33% (universities)
Q7- Do you take advantage of university extension information: 6.67% (No) – 93.33% (Yes)
Q8- What is your crop rotations: 15.38 (cereal-cereal-pulse-cereal; pulse-pulse-cereal-fallow) – 38.48 (cereal-pulse-cereal-pulse)
Q9- Do you purchase crop insurance: Yes (80%) – No (20%)
Q10- Do you perform tillage operations before planting: Yes (60%) – No (40%)
Q11- What implement(s) do you use for tillage: Chemical (11.12%) – Air (22.22%), Disc and Cultivator (33.33%)
Q12- Do you burn the stubble: Yes (6.67%) – No (93.33)
Q13- Do you use herbicides: Yes (80%) – No (20%)
Q14- Do you use herbicides before sowing or after sowing: 8.33% (pre-emergence) – 91.67% (post emergence)
Q15- Do you raise grain crops or forage: 33.33% (Crop) – 66.67% (Forage)
Q16- Do you use seed treatments: Yes (80%) – No (20%)
Q17- What is the type of pesticide that you use commonly: Glyphosate acid, thiamethoxam, tebuconazole (16.67%) – Other (49.99%)
Q18- What type of seed do you use for planting: Certified (13.33) – Population (33.33) – Both (53.34)
Q19- Do you use any bacteria inoculations on pulse crops: Yes (85%) – No (15%)
Q20- Do you do soil analyses before fertilizing: Yes (80%) – No (20%)
Q21- Do you use fertilizer before sowing: Yes (73.33%) – No (26.67%)
Q22- Do you use fertilizer after sowing: Yes (60%) – No (40%)
Q23- What is the amount (kg ha^{-1}) of fertilizer: <110 (66.66%); 110-200 (20.01%); >200 (13.33%)
Q24- Do you use grow regulator applications on your crops: Yes (93.33%) – No (6.67%)
Q25- Main problems on pulse growing: Insect (60%) – Anthracnose (20%) – rust (20%)
Q26- Do you have on-farm storage: Yes (86.66%) – No (13.44%)
Q27- If you have on-farm storage, what is the total capacity: <110 tons (30.8%); 110-200 tons (20.01);

>200 tons (13.33%)

Q28- Do you have problems during storage? If yes, what are they: Yes (60%) – No (40%). 22.22% (Mouse, Humidity) – 55.56% (Insect)

Q29- How do you eliminate the storage problems: Remove the seeds (11.12%) – Spray (33.33%) – Elevator (33.33%) – Climate control (22.22%)

Q30- Can you sell your products easily: Yes (93.33%) – No (6.67%)

Q31- Do you feel it is necessary to use genetically modified organisms: Yes (20%) – No (40%) – No idea (40%)

Q32- What is the most important aspect of crop production for your operation: Weed control (8.31%) – Yield stability (13.33%) – Fertilization (39.18%) – Disease and insect control (39.18%).

As a summary of the present study, the following points are highlighted which are in similar with the previous researches that mentioned in the below. The managed areas are bigger, cost of employers are not too much due to using mechanization technologies. Farmers get agricultural information from related foundations and especially from the universities. Rotation is mostly applied and crop insurance is purchased commonly. Using of certified seed is low. Bacteria inoculation and soil analyze is made widely. Main problems in growing of pulses are insect, anthracnose and rust factors. Most of the farmers have on-farm storage and can easily sell their products. Aspects of the growers are disease-insect control and fertilization, stability of yield and weed control, respectively.

Main problems of pulse growers in USA may be summarized by preferring non-certified seeds for sowing, biotic factors such as insect, anthracnose, rust and weed in addition to rising of inputs. Similarly, Akibode and Maredia (2011) implicated that, cereals such as wheat, rice, maize, millet, sorghum and the pulse crops take a little part in total agricultural area and production worldwide covering 61 million ha of harvested area in the world with 58 million ha in developing countries and 3 million ha in the developed regions. Importance of pulses in human nutrition is greater than their small quantities owing to their high protein and energy content and their use in diets of the poorest people instead of animal products. In developing countries, increasing of yield in pulses remains a major challenge to increase the competition of the pulse sector. Low input use, production pushed into marginal areas by expansion of cereal crops, reverse effects of agricultural policy focused on cereal crops for food security, and technological development to deliver new technologies and improved-cultivars to farmers caused to low productivity of pulse. Latest attempts by large pulse producing countries such as India and Brazil to develop and support technologies and increase pulse productivity are correct efforts. Although these steps and programs in large pulse producing countries serve as messenger of growth for the global pulse sector and it will be solution to reverse the decade long decrease trend in per capita person production and consumption in developing countries. As first recommendation, pulses are able to be used in many different forms. In some production systems, legumes are used for both a food and a feed crop (e.g., cowpeas in small-holder livestock systems in West Africa) and the seeds can be consumed as fresh or dry. In some production systems, the leaves are consumed as leafy vegetables. Various consumption forms of pulses act in providing the food security, nutrition and income needs of small holder growers in developing countries. Secondly, and related with the first matter, pulses provide an important source of income and meet the nutritional needs of families in many farming systems. Trends and changing patterns in the food vs. feed vs. vegetable use of pulse crops, and the gender size related with their production, marketing and consumption are political topics for further research.

Discussion

Sustainability in agricultural-economy begins by doing collaboration between producers and climate. As it well known, one of the most important limiting factors in agriculture is global warming and its drought effects. Most of the researches in the last century concern on yield which has been limiting to take care the food quality and sustainable agriculture (Falco and Veronesi 2014; Kahraman et al. 2015). In the respect of sustainability, it was also reported that, human pay more attention about the green house gas which is directly or indirectly related with global economic activities especially effected by transportation of food products across the continents (Schrobback et al. 2011; Avetisyan et al. 2014). For a better global economy, human being should have a big concern to determine the characteristics of plants which focused on both yield for growers and also quality for consumers. Fortunately, there are many highlights (Graham and Vance 2003) in the last decade which implicated by many scientific researchers who work on many features of plants by view of agri-environmental programs (Lankoski et al. 2010), quality (Onder and Babaoglu 2001; Kokten et al. 2009; Ozturk and Ada 2009), agronomic characteristics (Peksen 2005;

Bozoglu et al. 2008; Elkoca et al. 2008), growing and cultivation (Kaya et al., 2008), effects of genetic structure and environment, resistance to the abiotic (Ciftci et al. 2011) and biotic factors (McPhee et al. 2012) in addition to breeding for desired characteristics and using microorganisms (Infantino et al. 2006; Sahin et al. 2010; Ceyhan and Kahraman 2013; Ceyhan et al. 2014a; 2014b), hyper accumulator effects-phytoremediation and human health (Prasad 2006; Prasad and Nirupa 2007), industry and marketing (Olhan et al. 2010a; 2010b; Arisoy and Eraktan 2011; Lee 2011) etc. factors. Present paper also implicated similar results for the mentioned factors by view of producers.

High number of unemployment, low wages, hiring of low-skilled workers, competition between markets causes to negatively direct and indirect effects on labor markets (Olvera and Gonzalez 2015). Deterioration among the workers in public sector is quite high over the world. Informal incomes contributes consumption of continuous goods and services. One of the main point in that case in the difference of wages between private and public sector (Saha et al. 2014). Strategies of companies are important due to the role of production and eventual risks. It is different from most of the literature that, the exercise prize that minimizes the shortfall of the hedged portfolio is mainly under the effect of cash amount which spent for the hedging. It was confirmed that suboptimal option moneyless causes to a non-significant economic loss (Bajo et al. 2014). Over the last decade, trading by commodity traders has become an important appearance of financial markets. It was revealed that trading reduces the cost of hedging. Thus, traders are significant suppliers of price risk insurance (Brunetti and Reiffen 2014). It was indicated that, process for determination of prices may become stronger in case of the transferring politics is more exact under clearness and exhibition of demand and inflation expectations (Dunbar and Amin 2015). For those reasons, government politics over the world should be more relative and strict with markets by consider every single component of end products and show a stronger economic visibility.

Additionally, it was reported (Wilkinson 2012) that, change in cost price and inflation has no relationship the dynamics of the marketplace, both being influenced by a number of factors of the globe. The future has to include stronger customer-supplier relationship based on trust, respect and cooperation. It was revealed that the welfare incomes of cost sharing which makes a balanced nutrient decreasing may be 170 million euros per year over the world (Hyytiainen et al. 2015). Human should know that, each people acts on earth and effects the environment as negative or positive.

Results of the present research showed that there is need to the data transferring for legume growers to the other countries where various problems are detected such as growing techniques, storage, marketing, government supports etc. main highlights that may be provided from the present case in USA.

Conclusion

Present paper analyses the current status of legumes in the United States economy, marketing and producer demands. Pulses have an essential place in agricultural sustainability by acting on natural ecosystems, agriculture, agro-forestry due to be able fixing N by symbiosis which make them wonderful colonizers of low-N environments, besides being economic and environmentally friendly crop. Yield of pulses are still behind of cereals. Scientific researches focused on better balances the needs of third-world or sustainability of agriculture and economy within technologies of genomics and bioinformatics is needed. Beside many benefits on nutrition, protein of pulses are chiefly globulins and have small amount of sulfur containing amino acids (*methionine* and *cystine*) while containing higher amount of *lysine* beside higher calcium and iron than cereals. For that reason, pulses are the best essential amino acid supplementary for cereals by high biological value. Thus, financial condition of producers and customers would be better as well as health.

Results of the present study highlighted that there is a growing concern in pulse growing due to insect, anthracnose and rust factors. Aspects of the growers are disease-insect control and fertilization, stability of yield and weed control in addition to economic production by providing low inputs. Consequently, it is fair that legumes have a big importance in human nutrition due to be rich by protein, fiber, vitamin and mineral. They also contain high values of folic acid and water soluble vitamins. There is need to stronger and more specified breeding programs which are using biotechnology for time and budget save, low-cost technologies, disease and insect control, increased nitrogen fixation, adaptation to different soil and environments. For a better world, every single people take care the sustainability when their relations with the natural resources. Some of the highlights for present study are summarized in the below:
- Farming on bigger areas instead of fragmented lands,

- Innovation of technology for farming and industrial usage,
- Better data transfer and extension studies,
- Determination and applying of the optimum growing and cultural techniques,
- Government supports for farming and marketing.

Global trade procedures, reduction and division of agricultural lands, migration to urban areas, higher prices of agricultural inputs, low association of relatives, individual marketing, price volatility, lack of standardization etc. related factors are negatively affecting the agricultural finance. Future works should be focused on the mentioned subjects to improve the human wealth and welfare.

References

Akidobe S, Maredia M (2011). Global and Regional Trends in Production, Trade and Consumption of Food Legume Crops. Department of agricultural, food and resource economics, Michigan State University, Report Submitted to SPIA.

Arisoy H, Eraktan G (2011). A comparison of the revenues of wheat producers in Turkey, A case of EU member and non-member status with spatial reference to Central Anatolia Region. African Journal of Agricultural Res. 6(25):5614-5617.

Avetisyan M, Hertel T, Sampson G (2014). Is local food more environment friendly? The GHG emissions impacts of consuming imported versus domestically produced foods. Env. Res. Eco. 58: 415-462. DOI 10.1007/s10640-013-9706-3.

Bajo E, Barbi M, Romagnoli S (2014). Optimal corporate hedging using options with basis and production risk. North Ame. J. of Eco. and Finan. 30: 56-71.

Bozoglu H, Ozcelik H, Peksen E (2008). Changes in seed and leaf characteristics of common bean (*Phaseolus vulgaris* L.) cultivars treated with Co-60. Asian J. of Chem. 20(4): 3127-3134.

Brunetti C, Reiffen D (2014). Commodity index trading and hedging costs. North Ame. J. of Eco. and Finan. 21: 153-180.

Ceyhan E, Kahraman A (2013). Genetic analysis of yield and some characters in peas. Legume Res. 36(4): 273-279.

Ceyhan E, Kahraman A, Avci MA, Dalgic H (2014a). Combining ability of bean genotypes estimated by line X tester analysis under highly-calcareous soils. The Journal of Animal and Plant Sci. 24(2): 579-584.

Ceyhan E, Harmankaya M, Kahraman A (2014b). Combining ability and heterosis for concentration of mineral elements and protein in common bean (*Phaseolus vulgaris* L.). Turk. Journal of Agriculture and Fores. 38: 581-590.

Ciftci V, Turkmen O, Dogan Y, Erdinc C, Sensoy S (2011). Variation of salinity tolerance in bean genotypes. African Journal of Agricultural Res. 6(10): 2394-2402.

Dunbar K, Amin AS (2015). The nature and impact of the market forecasting errors in the Federal funds futures market. North American J of Economics and Finan. 31: 174-192.

Elkoca E, Kantar F, Sahin F (2008). Influence of nitrogen fixing and phosphorus solubilizing bacteria on the nodulation, plant growth, and yield of chickpea. Journal of Plant Nutr. 31(1): 157-171.

Falco SD, Veronesi M (2014). Managing environmental risk in presence of climate change: The role of adaptation in the Nile Basin of Ethiopia. Environ Resource Econ. 57: 553-577.

Graham PH, Vance CP (2003). Legumes, importance and constraints to greater use. Plant Phys. 131: 872-877.

Hyytiainen K, Ahlvik L, Ahtiainen H, Artell J, Huhtala A, Dahlbo K (2015). Policy goals for improved water quality in the Balctic Sea: When do the benefits outweigh the costs? Env. Res. Econ. 61: 217-241.

Infantino A, Kharrat M, Riccioni L, Coyne CJ, McPhee KE, Grunwald NJ (2006). Screening techniques and sources of resistance to root diseases in cool season food legumes. Euphyt. 147(1-2): 201-221.

Janzen E, Flaskerud G, Fisher J, Bartsch E (2006). Pulse Crop Marketing Guide. ND, USA, NDSU Extension Service.

Kahraman A (2017). Nutritional value and foliar fertilization in soybean. Journal of Element. 22(1): 55-66.

Kahraman A, Harmankaya M, Ceyhan E (2015). Nutritional variation and drought tolerance in chickpeas (*Cicer arietinum* L.). Journal of Element. 20(2): 331-341.

Kaya M, Kaya G, Kaya MD, Atak M, Saglam S, Khawar KM, Ciftci CY (2008). Interaction between seed size and NaCl on germination and early seedling growth of some Turkish cultivars of chickpea (*Cicer arietinum* L.). Journal of Zhejiang University-Science B. 9(5): 371-377.

Kokten K, Toklu F, Atis I, Hatipoglu R (2009). Effects of seeding rate on forage yield and quality of vetch (*Vicia sativa* L.) - triticale (*Tritico secale* Wittm.) mixtures under east mediterranean rainfed conditions. African J. of Bio. 8(20): 5367-5372.
Lankoski J, Lichtenberg E, Ollikainen M (2010). Agri-environmental program complience in a heterogeneous landscape. Environ Resource Econ. 47: 1-22.
Lee C (2011). Montana's pulse industry, How it has developed, economic impact and potential for growth. MT, USA, Montana Department of Agriculture.
McPhee KE, Inglis DA, Gundersen B, Coyne CJ (2012). Mapping QTL for fusarium wilt race 2 partial resistance in pea (*Pisum sativum*). Plant Bre. 131: 300-306.
Olhan E, Arisoy H, Ataseven Y, Ceylan C (2010a). Changes in livestock production support policies in Turkey and effects on production. J. of Ani. and Vet. Adv. 9 (3): 570-575.
Olhan E, Ataseven Y, Gun S, Arisoy H (2010b). The features of the farmers preferring environmentally friendly agricultural methods-the case of Turkey. Scientific Research and Ess. 5 (7): 646-653.
Olvera CGC, Gonzalez ER (2015). Measuring the impact of the Chinese competition on the Mexican labor market: 1990-2013. North Ame. J. of Eco. and Finance 34:351-363.
Onder M, Babaoglu M (2001). Interactions amongst grain variables in various dwarf dry bean (*Phaseolus vulgaris* L.) cultivars. J. of Agr. and Crop Sci. 187(1): 19-23.
Ozturk O, Ada R (2009). Correlation and path coefficient analysis of yield and quality components of some sunflower (*Helianthus annuus* L.) cultivars. Asian J. of Chem. 21(2): 1400-1412.
Peksen E (2005). Comparison of some common bean (*Phaseolus vulgaris* L.) genotypes for seed yield and related characteristics under Samsun conditions. J. of Fac. of Agric. OMU. 20(3): 88-95.
Prasad MNV (2006). Trace elements in medicinal plants, environmental quality and human health concerns. Ecological Eng. 16: 56-58.
Prasad MNV, Nirupa N (2007). Phytoferritins - Implications for human health and nutrition. The Asian and Aust. J. of Plant Sci. and Biotech. 1(1): 1-9.
Saha S, Roy P, Kar S (2014). Public and private sector jobs, unreported income and consumption gap in India: Evidence from micro-data. North American J. of Economics and Fin. 29: 285-300.
Sahin S, Karaman MR, Duzdemir O (2010). Residual effect of bacterium (*Rhizobium* spp.) inoculated chickpea (*Cicer arietinum* L.) genotypes on nitrogen (N) use efficiency of some wheat plants. African J. of Agr. Res. 5(16): 2215-2221.
Schrobback P, Adamson D, Quiggin J (2011). Turning water into carbon: Carbon sequestration and water flow in the Murray-Darling Basin. Environ Resource Econ. 49: 23-45.
Şenol Ş (2012). Araştırma ve Örnekleme Yöntemleri. Nobel Akademi Yayıncılık, Ankara, Türkiye.
Wilkinson A (2012). Farming, Taking the Pulse. HSBC Commercial Banking, HSBC Agriculture.