CITRUS GROWERS' POINT OF VIEW REGARDING THE KNOWLEDGE OF AGRICULTURE EXTENSION WORKERS IN CLIMATE CHANGE FOR CITRUS PRODUCTION OF DISTRICT BATI KOT, NANGARHAR- AFGHANISTAN

SALAHUDDIN HIDAYAT[1], MUHAMMAD ZAFARULLAH KHAN[1], Urooba Pervaiz [1] and Irfan Ullah[2]

1. Department of Agricultural Extension Education and Communication, The University of Agriculture Peshawar, Khyber Pakhtunkhwa-Pakistan
2. Department of Agricultural & Applied Economics, The University of Agriculture Peshawar-Pakistan

Corresponding Author: Salahuddin Hidayat

ABSTRACT

A study was conducted in District Bati Kot, Nangarhar-Afghanistan during 2022 to assess the citrus growers concern about skills of extension workers regarding climate variability for citrus production in Afghanistan. Multistage sampling technique was used for selection of 120 respondents. Moreover, rank order, mean and standard deviation was used for assessing the extension workers' expertise, while chi-square test was used to find the association between different variables. Information on various variables of socio economic characteristics, ranking of skills of extension agents regarding suitable climate for citrus production were collected through well-structured interview schedule. The results revealed that most of the respondents involved in citrus cultivation were in middle age of 40-50 years, with land holding size of 1–6 acres. However, 55 percent respondents were found illiterate where 45 percent have formal education of different levels with prominent category of primary to inter level education. The ranking skills of extension workers in climate change was the know-how with climate change was ranked on top with highest mean of 3.40 and standard deviation 0.938 and the understanding & Communicating weather forecast were found at lowest rank with lowest mean of 2.383 and standard deviation 1.055 in the skills of climate change. Highly significant association was found between the skills of extension workers in climate change scenario and average yield of citrus production. It is suggested that extension workers should be trained in the changing climate scenario of the particular area for the production of citrus who in turn can train citrus growers for getting their better yield in citrus by alleviating the poverty of extreme war affected area to stop them from migration and concentrate on the development of Afghanistan through subsidizing the citrus growing inputs. Moreover, proper attention towards the changing climate is the need of the day for sustaining agriculture and especially in horticulture for the betterment of humanity in general and Afghanistan in particular. Agriculture extension workers can advise citrus growers on climate-resilient practices, helping them to adapt the changing climate conditions and minimize risks related to extreme weather events.

Keywords: skills of climate change, multistage sampling, agriculture extension workers, citrus production, Nangarhar, Afghanistan

INTRODUCTION

Citrus can be a leading fruit of Afghanistan if proper attention is given which can be grown almost in the entire country due to the prevailing conditions of country which are viable for citrus production. In our neighboring country of Pakistan conditions for citrus production are almost suitable for citrus production. Districts of Sargodha, Jhang, Sahiwal, Multan, Mianwali, Rahimyar Khan and Toba Tek Singh in the province of Punjab are prominent citrus exporters as well as in production by earning handsome foreign exchange however, District Sargodha is on top in this regard. Various cultivars are cultivated in Afghanistan where sweet orange has significant position in the country. However, per hectare production of citrus is lower than the potential.

This low production is attributed to various reasons identified by various researchers. These reasons are widespread to socio-economic conditions of citrus growers, research status, technology transfer activities and extension field work. Likelihood of poor adoption of improved practices also intensifies the constraints while climate change is burning issue now days throughout the world. (Gangwar *et al*., 2007) revealed lack of finance as more dominant factor responsible for lower production. They justified the statement mentioning farmers' misery to remain unable to purchase the essential inputs at application time. This uncertain situation cause production gap due to inadequate management and non-adoption improved production practices.

(Tariq *et al*., 2006) described the adoption of poor management practices like inadequate fertilizer and nutrients management plights responsible for lower production of citrus. (Mattos *et al*., 2007) highlighted the nutrients deficiency in Pakistani citrus orchards pertinent to inappropriate supply of micronutrients, essential for the bearing and non-bearing trees.

Climate change is known phenomenon in the world of climate revolution categorized by the changes in the usual climate of the planet (regarding temperature, precipitation and wind) that are exclusively instigated by human activities. As a result of unbalancing the weather of earth, the sustainability of the planet's ecosystems is under threat, as well as the future of humankind and the stability of the global economy. As per NASA's definition of climate change "a broad range of global phenomena created predominantly by burning fossil fuels, which add heat-trapping gases to Earth's atmosphere. These phenomena include the increased temperature trends described by global warming, but also encompass changes such as sea-level rise, ice mass loss in Greenland, Antarctica, the Arctic and mountain glaciers worldwide, shifts in flower/plant blooming and extreme weather events. (Khan *et al*., 2018) revealed in his project study that length of summer length was longer due to rise in temperature over the last 20 years because of inadequate rainfall causing shortest winter season, while spring season was merged in summer due to temperature increase in spring. Nangarhar Province in Afghanistan has a rich tradition of citrus cultivation, which serves as a critical source of income for many rural households. The study explores the multifaceted relationship between citrus production and the socioeconomic status of growers. Citrus farming not only generates income but also provides employment opportunities and contributes to food security. Therefore, this study was initiated to explore the citrus growers' point of view regarding the knowledge of agriculture extension workers in climate change in citrus production of District Batikot, Nangarhar- Afghanistan.

Objectives

The study has the following objectives:

1- To know the socio-economic characteristics of citrus growers.
2- To know the skills of extension workers in climate change for citrus production in improving the socio-economic status of citrus growers.
3- To give policy recommendations for further improvement.

MATERIALS AND METHODS

The universe of the present study was Nangarhar Province-Afghanistan was the universe of this particular study in the end of 2022. The required sample was drawn through Multi Stage Sampling Technique MST as practiced by (Cochran, 1977). At stage I, from Province of Nangarhar, Bati Kot was selected purposively from 22 Districts by keeping in view the citrus cultivation. Bati Kot consists of 12 villages, out of these 5 villages were purposively selected due to citrus cultivation at stage II. For selection of respondents at village level, a list of citrus growers was obtained from Agriculture Extension Department, which comprised of 200 citrus growers in the selected villages. Proportionate allocation technique was used to select 60% of the citrus growers for data collection, giving a total of 120 respondents. For collection of data, a well-developed interview schedule was used which was prepared in English but the interviews were conduct in local language "Pashto". Obtained data was analyzed using SPSS, results were presented in frequencies/counts and percentages.

RESULTS AND DISSCUSION

Socio-Economic Characteristics of the Citrus Growers

Household Size of the Citrus Growers

As a result of the world's rapidly growing population, there may be a shortage of food and other basic requirements. The population of the world needs to be controlled in order to resolve all these problems. In the adoption process, the size of the household is crucial (Sanaullah *et al*., 2020). Table 1 shows that only 9.2% citrus growers fall in the group of household size with four members, 43.3% of citrus growers have household size with 12 or more members. Furthermore, 20% respondents belong to household size of 5-8 members and 27.5% belongs to the house hold size of 9-12 members. As said earlier, big household size has a rich numbers of members by having sufficient persons and they will not require hiring labor for different field hiring activities. Our findings are similar with Ayat, (2014) who revealed that 38.8% were living in a size of 11-20 members as our results revealed that maximum citrus growers' household size was above 12 members.

Land Holding of the Citrus Growers

The farmers' size of land holding varies significantly because some citrus growers only have a low acreage of land available for growing citrus trees. They rarely sell their harvests due to their low production and they mostly use farm products as per their own needs and requirements. Small landowners have less interaction with extension agents and are less likely to incorporate

contemporary cultural practices into their farming. Since they can afford new technologies for improved output while remaining an expensive lifestyle, farmers with larger landholdings are often thought to be more enthusiastic about adopting innovations (Ajayi *et al*., 2000). They have more access to agricultural knowledge than individuals who own tiny and limited plots of land for cultivation (Chaudhary, 2006). Table 1 illustrates that 66.7% citrus growers in the current study area had small land holdings of 1-6 acres, while minimum 8.3% farmers had 13-18 acres of land holdings. About 11.7% of the respondents had land holdings of more than 18 acres, in contrast to 13.3% of the respondents who owned between 7 and 12 acres of land specified for citrus. These results are in alignment with those of Sanaullah (2020), who found the limited land ownership of the maize growers in the study area. Our findings are in agreement with Safdar (2005), who also reported that most of the growers (60%) had small less than an acre for tomato cultivation in District Malakand, Khyber Pakhtunkhwa- Pakistan, although crop (tomato) and neighboring country location is different.

Tenancy Status of the Citrus Growers

The term tenancy refers to a part and parcel of land that has been assigned to farming by the farming community, and it plays a distinctive role in the adoption of new technologies (Idrees, 2000). Land is not only a source of sustenance for farmers, but it is also a symbol of social standing, prestige and economic success along with source of employment for those who work full time in the agricultural industry. The history of land reforms has shown that tenancy is significant impediment to agricultural development, as seen by the fact that agricultural growth remains slow and sluggish. Data in Table 1 revealed that majority of the citrus growers constituting (60.8%) belongs to the group of owner cultivator while 26.7% citrus growers were tenants and only 12.5% citrus growers were found owner-cum-tenant. The adoption of contemporary technology is positively correlated with the size of the land holding (Mirza, 1993). Tenants are less receptive to new ideas than owner-growers. In order to promote agricultural activities in a sustainable manner, extension professionals should increase tenant farmers' enthusiasm for implementing new technology in their farms. Our findings are consistent with those of Aziz *et al*. (2018), who discovered that owner cultivators made up the majority of respondents (70.83%) in the research area.

Table 1 ***Socio-Economic Characteristics of Citrus Growers***

Household Size (Members)	**Frequency**	**%**	**Land Holding Size (in acre)**	**Frequency**	**%**
1 to 4	11	9.2	**1 to 6**	80	66.7
5 to 8	24	20.0	**7 to 12**	16	13.3
9 to 12	33	27.5	**13 to 18**	10	8.3
Above 12	52	43.3	**Above 18**	14	11.7
Total	120	100	**Total**	120	100
Tenancy Status	**Frequency**	**%**			
Owner cultivator	73	60.8			
Owner-cum-tenant	15	12.5			
Tenants	32	26.7			
Total	120	100			

Source: Field Survey data 2022

Perception of Citrus Growers about Extension Workers' Skills in Climate Change regarding Citrus Production

Climate change issues encompass a wide range of challenges, including rising global temperature, sea-level rise, extreme events and the loss of biodiversity. These issues pose significant threats to ecosystem, human health and the overall stability of the planet. Diversified research studies have revealed the difference between climate change duty and ability to contribute, on the one side and climate change economic effects, on the other (Tol *et al*., 2004). Data in Table 2 shows the ranking skills of extension workers in climate change from citrus growers' point of view on the basis of mean and standard deviation the familiarity and know-how with climate change which was ranked 1st with highest mean 3.40 and standard deviation 0.938 Promotion along with cultivation of improved varieties of citrus was ranked 2nd with the mean value of 2.83 and standard deviation 1.048. Recording and reporting of climate change was ranked 3rd with the mean value of 2.525 and standard deviation of 1.174 while understanding and communicating weather forecast was ranked at last with lowest mean value of 2.383 and standard deviation of 1.055. This is clear that the understanding and communicating weather forecast was known to citrus growers due to their vast experience and their own involvement in farming.

Table 2 ***Perception of Citrus Growers regarding Extension Workers' Skills in Climate Change***

Skills regarding climate change	1	2	3	4	5	Mean	S.D	Ranks
Familiarity with climate change	4(3.3)	13(10.8)	47(39.2)	43(35.8)	13(10.8)	3.40	0.938	**I**
Promoting cultivation of improved citrus varieties	16(13.3)	22(18.3)	55(45.8)	20(16.7)	7(5.8)	2.83	1.048	**II**
Recording & Reporting Climate change	28(23.3)	32(26.7)	37(30.8)	15(12.5)	8(6.7)	2.525	1.174	**III**
Understanding & Communicating Weather forecast	30(25)	33(27.5)	41(34.2)	13(10.8)	3(2.5)	2.383	1.055	**IV**

Scale: 1= Very Low 2= Low 3= Medium 4= High 5= Very High S.D=Standard Deviation

Association between Average Yield of Citrus and Skills of Extension Workers in Climate Change

Chi-square test was used to find out the association between average yields of citrus with skills of extension workers in climate change in the study area. Table 3 showed highly significant association (p=0.000) between average yield of citrus with skills of extension workers in climate change. The findings indicated that as the skills of extension workers in climate change improve farmers obtain more production play a significant role in the production.

Table 3 *Association between Average Yield of Citrus and Skills of Extension Workers in Climate Change*

Average yield of citrus (Kg/Acre)	Skills of extension workers in Climate Change					
	Very low	Low	Medium	High	Very high	Total
Up to 3000	19(15.8)	10(8.3)	1(0.8)	0(0)	0(0)	30
3001 to 6000	23(19.2)	26(21.7)	6(5)	0(0)	0(0)	55
6001 to 8000	4(3.3)	7(5.8)	8(6.7)	2(1.7)	0(0)	21
Above 8000	0(0)	0(0)	10(8.3)	4(3.3)	0(0)	14
Total	46(38.3)	43(35.8)	25(20.8)	6(5)	0(0)	120
	x^2 =67.467			P-value=0.000***		

Data source: Calculated by Author

Note: *** indicates significant at 1 percent level of probability

CONCLUSIONS AND RECOMMENDATIONS

It is concluded that majority citrus growers were found in joint families in a 12 member's household size by possessing 1-6 Acres of land. Skills of extension workers in climate change has significant role in citrus production as per their familiarity with climate change which were the top rank skills in the perception of citrus growers. This shows their interest and commitment with the citrus orchards to improve and sustain their production. Special trainings are needed to to extension workers in climate change for educating the citrus growers for getting the higher production of citrus in the present financial crises. The study underscores the importance of a holistic approach to improving the socioeconomic status of citrus growers in Nangarhar Province, Afghanistan. Effective agricultural practices, technological advancements, improved market access, and supportive government policies collectively contribute to enhancing the livelihoods of citrus growers. The recommendations derived from this research can guide policymakers and stakeholders in implementing measures that promote sustainable citrus production and elevate the overall socioeconomic status of citrus growers in the region.

It is recommended that:

- Extension workers may educate regarding the awareness of changing climate for better citrus production practices to improve their socio economic conditions.
- Youth should be trained in the various aspects of climate change for tackling the various hindrance of climate who can be role model in alleviation of poverty by spending their life efficiently. More formal trainings regarding different aspects of citrus cultivation and production may be arranged by Extension Department especially in climate change to motivate youth towards citrus farming on large scale and sustainable basis.
- Youth may be sent in other parts of the world for climate training that can play their role for the better future of Afghanistan which is more damaged due to war through financial assistance by the international agencies facilitating the manpower to be trained in climate change due to their major share in disturbing the climate.

REFERENCES

Ajayi, O. C., S. Franzel, E. Kuntashula and F. Kwesiga. 2000. Adoption of Improved Fallow Technology for Soil Fertility Management in Zambia: Emprical Studies and Emerging Issues. Agro-Forestry System. 59(3): 317-326.

Ayat, U. (2014) An Investigation into The Role of Livestock Extension Services in Influencing Dairy Farming in District Peshawar. Unpublished Thesis, Department of Agricultural Extension Education & Communication, The University of Agriculture Peshawar.

Aziz, R., B. N. Siddiqui, J. Ali, A. Ali, S. Fahmid, Q. Raza and M. A. A. Akram. 2018. Relationship between socio-economic aspects of farmers and their awareness and adoption of short agricultural messages telecast on PTV. International. Journal Advanced Research in Biological Sciences. 5(1): 25-33.

Chaudhary, K. M. 2006. An Analysis of Alternative Extension Approaches to Technology Dissemination and its Utilization for Sustainable Agricultural Development in Punjab, Pakistan. Ph.D Thesis, Department of Agricultural Extension, University of Agriculture Faisalabad.

Cochran, W. G. 1977. Sampling techniques. 3rd Edition. John Wiley & Sons, New York. Pp. 37-40.

Gangwar, L., S. Singh and D.B. Singh. 2007. Estimation of post-harvest losses in Kinnow mandarin in Punjab using a modified formula. Agric. Econ. Res. Review. 20(2):315-31.

Idrees, M. 2000. Developing a strategy for mobilizing rural youth for the development of agriculture in NWFP- Pakistan. (Doctoral dissertation, University of Agriculture, Faisalabad). Pp. 46

Khan, M. Z. Khan, N. P. Khan and K. Nawab. 2018. Farmers' Perception of Climate Change and Adaptation in Khyber Pakhtunkhwa, Pakistan. Gontor Agrotech Science Journal 4(2): 107-124.

Mattos, J.D., J.A. Quaggio and H. Cantarella. 2006. Response of young citrus trees on selected rootstocks to nitrogen, phosphorus, and potassium fertilization. J. Plant Nutr. 29:1371-85.

Mirza, M. W. 1993. Socio-Economic Study to Analyze Constraints in the adoption of Modern Technologies by Various Groups in District Sagar (Madhya Pardesh). Crop Research Hisar. 12(1): 89-95.

Safdar, S., S. Muhammad and T. E.Lodhi. 2005. Need for Agriculture Extension Services for Rural Women in Tehsil Faisalabad, Pakistan. Journal of Agriculture and Social Sciences (Pakistan). 1(3): 497-501.

Sanaullah, U.P., S. Ali, M. Fayaz and A. Khan. 2020. The impact of improved farming practices on maize yield in Federally Administered Tribal Areas, Pakistan. Sarhad J. Agric. 36 (1): 34-43.

Tariq, M., M. Sharif, Z. Shah and R. Khan. 2007. Effect of foliar application on the yield and quality of sweet orange (Citrus sinensis L.) Pak. J. Biol. Sci. 10(11):1823-28.

Tol, R. S., T. E. Downing., O. J. Kuik., and J. B. Smith. 2004. Distributional aspects of climate change impacts. Global Environmental Change. 14(3): 259-272.