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Farmers' Perceptions and Beliefs Regarding Future of Rice Crop in the Kallar Tract of the Punjab, Pakistan

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***Abstract* – A survey of rice farmers was conducted in traditional rice growing area also called the Kallar tract, known all over the world for its fine and long grain aromatic Basmati rice. The purpose of the survey was to assess the farmers' attitudes, perceptions and beliefs regarding future of rice crop in this area. During survey and through face to face interviews of rice farmers, it was found that 48% farmers were dissatisfied whereas 39.3% farmers were satisfied from future of rice farming. The main reasons behind dissatisfaction were non introduction of new varieties (87.3%) small land holdings (79.3%), high costs of inputs (76.7%), scarcity of irrigation water (60%), lack of interest of youth (53.4%) to adapt crop farming as a profession and shortage of credit (46.7) to purchase inputs to the crop. In order to make the future bright of this crop the positive change in attitude and philosophy among decision-makers, scientists and others stakeholder to acknowledge the importance of this crop for mankind was proposed. Besides this it was also suggested that while formulating policies and extension training programs regarding agriculture the purchase of rice at international market rates, provision of irrigation water, crop insurance, minimizing the role of middle man, to offer more incentive to investment in agriculture for sustainable rural development, encouraging young educated people to choose farming as a profession and promoting a sense of pride in farmers must be given due importance.**

***Keywords* – Kallar Tract, Rice Future, Middle Man, Land Holding, Agricultural Inputs, Irrigation Water.**

I. INTRODUCTION

Rice is a staple food for more than half of the world's population and demand of which is growing faster than the population. It is grown in more than one hundred countries [1].In Pakistan rice is the second staple food after wheat and has been a major source of foreign exchange earnings [2]-[3]. Rice in Pakistan is grown on an area of 2.79 million hectares with a production 6.8 million tonnes chiefly in the Punjab and Sindh followed by Khyber PukhtoonKhwa (KPK) and Balochistan[4]. In the province of the Punjab, there is a special rice area called "Kallartract" well known all over the world for fine aromatic "Basmati" rice production [5]-[6].

Pakistan ranks fourth among the leading rice growing countries in the world. But unfortunately in Pakistan rice yield is not only very low, as compared to that of other countries, but also reported to be declined [2]. The causes of low rice yield include pest insects, diseases, low varietal potential, non-availability of irrigation water and above all desperation of resource poor rural farmers.

Much has been written on the land use pattern and practices but only a little work has been done on the farmers' who manage and utilize their resources to sustain or enhance the per acre yield. Due to this reason in the recent years agricultural scientists are being inspired to build their research plans on farmers' knowledge, perception and practices that are the backbones of agricultural production systems and thus are helpful to evaluate future prospective of the systems [7]-[8]. As a matter of fact the desperate farmers are less conscious about the health and productivity of the system. This behavior of farmers has deleterious effects on future of farming in a country.

Keeping in view this mind set of farming community the preset study was designed to know the future of rice farming in Kallar tract from farmers' perspective.

II. MATERIALS AND METHODS

The survey was conducted in the Kallar tract consisting of three districts: Gujranwala, Sheikhupura and Sialkot (Figure 1) [9]-[6]. Through meeting with farmers a preliminary questionnaire was developed with appropriate information about their beliefs regarding future of rice crop. This questionnaire was pre-tested by interviewing some other farmers to make in it some important changes before giving it a final format.

During the survey50 male farmers from each district were chosen at random and a total of 150 farmers were interviewed face-to-face. Each interview took about 30 to 45 minutes. The theme of interviewswas to obtain a clear picture of the farmers' perception about the future of rice crop farming.

The questions were asked in Punjabi (local language) and the answers were then translated into English to fill the questionnaire. In order to get the clear picture of internal consistency and completeness of the thinking of each respondent about the rice farming and its future the technique of triangulation was observed strictly [10].Coded data were analyzed in Microsoft EXCEL worksheet to determine the frequencies and percentages of farmers' responses.

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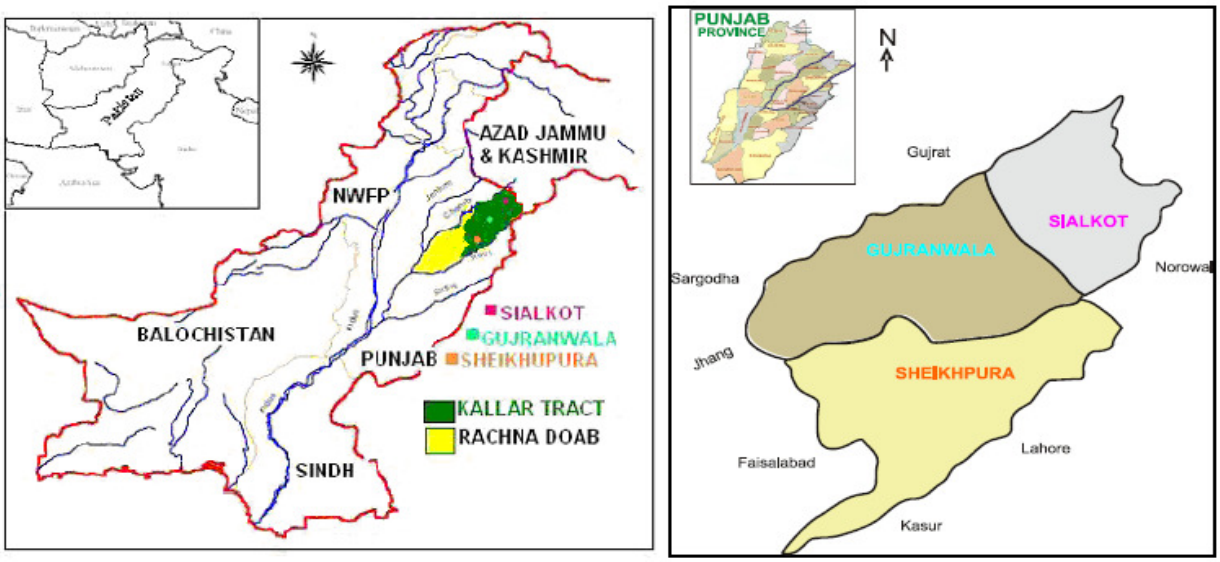

Fig.1. Maps (a) Kallar tract (b) Research localities in the Kallar tract (Suhail et al.,2007;Asghar et al., 2012)

III. Results and Discussion

A. Socio-economic characteristics of the farmers

These include education, age and land holding of farmers which are the reflection of their status in the society. These are described as under

Educational levels of the farmers

Education level of farmers in study area was found low (Table 1). Out of the 150 farmers, 32.0% were illiterate, 55.3% had attained education up to 8 years schooling whereas 12.7% had undergone secondary school or higher education.

Previous survey studies in this area also showed similar trend of lower level of education among rice farmers [11]-[6]-[12]. Most of the farmers in the study area were illiterate or with average literacy level and it is very difficult to make them realize the new concepts of farming [12] because illiteracy increases communication barriers. According to some studies [13] strong links exists between education and agricultural output. Resultantly low yields leading to low profits are expected which definitely will make farmers incensed from rice cultivation.

Different age groups of the farmers

Among the 150 respondent farmers, 12.7% were of young age (up to 30 years), 40.7% were of middle ages (31-50 years old), while 46.7% were older (above 50 years old) (Table 1).

It is cleared that most of the farmers (87.4%) in the present survey belonged to middle or old age group i.e above 31 years old. These results are similar to those of [14]-[15]-[6]-[12].

These results indicated that trend of young people towards land farming is declining (even in rural areas) which is very alarming for the future of an agricultural based country like Pakistan. Therefore a new policy for agriculture in Pakistan must discover the ways to encourage and inspire young and able bodied people to choose farming as an occupation because they are critical to the future of this sector[16].

Education and age help to improve the managerial ability of the farmer and both are expected to contribute constructive role in dealing with rapid change in farming system and the improving system's efficiency [14]. But here the farmers are of old ages with low education so their experience cannot be utilized efficiently.

Table 1 : Educational levels and age groups of the farmers

Educational level of the farmers			**Different age groups of the farmers**		
Educational levels	**Frequency**	**% age**	**Age groups**	**Frequency**	**% age**
No schooling (illiterate)	48	32.0	Young aged (up to 30 years)	19	12.7
Below secondary school (8 years)	83	55.3	Middle aged (31-50 years old)	61	40.7
Secondary school and above (10 years or more)	19	12.7	Old aged (above 50 years)	70	46.7

Land holding of the farmers

The results of table 2 indicated that most of the farmers (79.3%) had less than 5 hectares of land (small land holdings), 12.7% were those having land holding ranges from 5-15 hectares whereas8.0% of the farmers were those having land more than 15 hectares and thus belonged to big land owner category.

These results are similar to those of [17]-[6]-[12] who stated that land holding of the farmers in the study area ranged from 0.5 to 1.5 hectares. However, the results are

different from those of [14] and [18] who reported that average operational land holdings of the farmers in their study was more than 8-10 hectares.

According to [19] the farmers having big land holding use optimum to maximum levels of agrochemicals to maximize their yields also as a symbol of social status. Another theory stated that the small farmers for their survival and economic pressure could be more efficient in utilizing limited available resources [14]. The matter in real is that farmers with big land holdings mostly are rich and have good working relationships with agriculture department and thus remain aware of new technologies about crop production and protection. They are also able to arrange agrochemicals timely. All these factors contribute towards their good crop stand resulting in higher yields as compared to small land holders which have stuck to subsistence farming approach and become frustrated whenever they did not earn a better crop return.

Table 2: Land holding of the surveyed farmers.

Farm size	Frequency	% age
Small (< 5 ha)	**119**	**79.3**
Medium (5-15 ha)	**19**	**12.7**
Big (> 15 ha)	**12**	**8.0**

B. Satisfaction of farmers about future of rice crop

It is quite unfortunate of rice that majority of the farmers (48.0%) of the farmers was completely dissatisfied about its future while 39.3% were hopeful about its bright future. The farmers who did not respond distinctly and were in state of disarray were 11.3% (Table 3).

This showed that about 50% of the farmers were not satisfied about the future of rice farming. This figure has alarmed the bells signaling the loss of confidence and interest of rice farmers to grow rice as a profitable crop. This has also assigned a question mark on the vision of stakes holders and policy makers of rice crop who have failed to satisfy the rice producers as for as its economic return is concerned.

Table 3: Satisfaction about future of rice

Farmers' Response	Frequency	%age
Yes	59	39.3
No	72	48.0
Can't say any thing	17	11.3

C. Reasons for not satisfaction about future of rice

The results of the question about non satisfaction about future of rice crop are summarized in table 4. A big portion of the respondents (66.7%) gave the reason of low price of rice harvest for their disappointment about future of rice crop. Another sizeable segment (76.7%) of the farmers stood responsible to the high prices of crop inputs for their dissatisfaction.

But another major portion (87.3%) of surveyed farmers blamed that no new successful variety of rice has been introduced since long and the present verities have become susceptible to diseases and have lost their yield potentials. According to them if in near future no new rice variety is introduced they will be forced to give up its cultivation. About 60.0% of the farmers interviewed were of the view that water shortage was also a big hindrance for their disappointment. Non availability of agricultural credit was also a reason for their frustration according to 46.7% of the farmers (Table 4).

D. How future of rice can be made bright (MRA)

At the end the farmers were requested for their suggestions to make bright the future of rice crop. According to table 5, most of the farmers (87.3%) suggested that new varieties with good yield must be introduced at the earliest to satisfy the farmers. Some (29.3%) farmers suggested that strict pesticide rules must be implemented to have the availability of fit pesticides. More than half of the farmers (58.0%) were of the view that lowering the cost of agricultural inputs i.e., agrochemicals, seeds, diesel for running tube wells etc may help the farmers to use the fertilizers in balance proportion and spray their crops against rice diseases timely to have good yield. Moderate number 54.0% of farmers think that government should buy agricultural produce directly from the farmers so that they may become safe from the brutal hands of middle men. While 33.3%of the respondents demanded reasonable support prices for their produce because the market prices generally were lower than what it costs to produce the grain. A big portion (60.0%) of the farmers suggested that in order to overcome the water shortage the Government must construct new dams.

Table 4. Reasons for not satisfaction about future of rice (MRA)*

Reasons	Frequency	%age
Low prices of Produce	100	66.7
High Input prices	115	76.7
No New Variety	131	87.3
Water shortage	90	60.0
Non availability of Credit	70	46.7

*(multiple responses were allowed)

Table 5. How future of rice can be made bright (MRA)

Suggestions	Frequency	%age
Introduction of new varieties	131	87.3
Availability of fit pesticide	44	29.3
Lowering the costs of inputs	87	58.0
Purchase of produce by govt.	81	54.0
Reasonable support price	50	33.3
Construction of new dams	90	60.0
Crop insurance scheme	19	12.7
Availability of credit	70	46.7
Elimination of the role of middle man	122	81.3
Govt. polices regarding Agriculture	80	53.3
No response	7	4.7

*(multiple responses were allowed)

When farmers were asked about crop insurance 12.7% were agreed upon this but 46.7% demanded credit facilities from the government so that they may be in position to buy the inputs to raise their crops and remain safe from the hands of middle men (81.3%). According to 53.3% farmers Government should change its policies

regarding agriculture by providing subsidies to agricultural inputs. It was quite amazing that only 4.7% did not respond to this question.

The results are in accordance with those of [20] they were of the view there will be serious decrease in rice acreage if dramatic increase in rice price is not done and diesel prices are not lowered, moreover due to heavily relying on one rice variety the rice crop suffered a lot from Blast disease and many farmers are opting to plant other crops. Similar types of results have been reported by[21].

According to [12] and [22]the current rates of rice grain were lower than the cost of its production. They were also of the view that in order to ensure the survival of troubled rice farmers there is need for reduction of production cost especially of agrochemicals.

As for as purchase of rice produce by the Government is concerned, similar type of practice is being practiced in Thailand. According to [23] the government will continue its rice-pledging programme as it has raised farmers' incomes. This was also because most rice farmers were "quite satisfied" with the government's pledging scheme as they had faced higher production due to this programme.

Khan [24] was of the view that support price has always benefited the large farmers. Small farmers (majority of the farmers) have little surpluses produce to market and are always in dire need of cash not only to pay back what they have borrowed from various credit sources but also to buy inputs for the next crop. In Pakistan Government announced support price for rice and other important crops but she does not buy produce from common farmers. The fact is that if prices in open market are less as compared to support price the Government buying agencies only favor to big land owners. On the other hand if prices in open market are high the said agencies forcefully buy the produce from small farmers. In this way support price proved a sword with two sharp edges for small farmers and thus fulfill a common phrase that support price is nothing but short of implicit mass murder. The Government should buy the produce at international rates or buy it from even from small farmers at announced price, and just announcement of support price should be discouraged instead. Therefore, the results are partially in accordance with those of [23].

As in case of losses due to natural calamities and severe pest or disease attack the small farmers in such cases suffer more due to the losses and ultimately the agriculture suffers. If there is no insurance plan for the famers they may become incense from growing rice crop. Some factors such as payment of premium by installments, paying the actual value of losses by banks at the appropriate time and improving their service qualityshould be considered as major priorities to satisfy rice farmers as for as rice crop insurance policy is concerened. The crop insurance facility should also be provided to small land holders in order to decrease poverty and to improve their socio-economic conditions of the farmers [12]-[25] and [26].

From the results it is evident that most of the rice farmers were small land holders and thus mostly were poor. The poor farmers always remain short of capital and seek for credit to buy inputs to raise their crops. The results are in agreement with those of [12]. Lack of credit and finance is a big problem during rice production process. This is also because cost of production has increased many folds as compared to that of rice produce. Resultantly the farmers were depending on input supply dealers or middlemen who get their money back at harvesting of crop in form of cash or kind with higher interest rates. This situation further deteriorates the economic conditions of poor and small farmers.

Rice is the only cereal that can grow in standing water. It requires continuous and excessive irrigation throughout its growth. Due to non-availability of water or due to high expenses to use underground water farmers reduce the number of required irrigations to mature the crop. Resultantly yield of rice crop is reduced and the farmers become indignant. Therefore it is suggested that in order to solve water issues in agriculture the government must construct new dams and develop infrastructure for irrigation[12]-[16]and [24].

Due to strong role of middlemen the farmers fail to get the real price of their produce. They are one of the biggest hurdles to improve the socio economic conditions of the small farmers. The results are in accordance with those of [26] and[27].

The agriculture in Pakistan has been regarded as backbone of its economy but govt. focus is on mainly on industrial development. This attitude of the govt. has discouraged a big proportion of farmers from growing rice crop. Therefore farmers also showed disappointment over the government policies regarding agriculture and the initiatives taken by government authorities to resolve the problems faced by them. The results are in accordance with those of [12].

IV. Conclusion

The results of present study have some important policy implications. As the rice farmers have become desperate from future of rice crop so their young children and of labor class are migrating towards big cities for search of jobs or business. This attitude of rice farmers has fainted the future of this important crop. Therefore a new policy for agriculture in Pakistan must discover ways to persuade and encourage young and able bodied people to choose farming as an occupation besides addressing the illiteracy and increasing average age of farmers. The old aged and uneducated farmers mostly are technically inefficient and therefore always hesitate to adopt new technologies and remain involved in practices of traditional agricultural techniques. Thus there is dire need to raise the education level of rural community. For this purpose the private sector should be encouraged to invest on education in the rural areas. Resultantly it will be comparatively easy to motivate the new educated generation to participate in agricultural related activities. Also they will have better ability to adopt modern technology and to make science based timely decisions. It is also a need of time to take proper measures to reduce the various inputs used for rice production. It is better if fertilizers, pesticides and quality seeds are available timely at subsidized rates. In order to

stop the sale of adulterated pesticides there must be implementation of strict rules. Support price is referred as "nothing short of implicit mass murder" and hence is not a good solution to bring stability in prices and to have better production instead farmers should be given international price of the commodity to increase agricultural production. This will also be helpful for economic agents to understand in a better way the dynamics of the international market. The Government institutions such as banks etc could also tie up their insurance and credit supply policy with the purchase of rice produce at the rates of international market to solve the credit unavailability problem. This will also help to eliminate the role of middlemen. Actually Govt. polices are the real driving forces to encourage any sector of its population for a particular function. Therefore, more incentive to investment in agriculture for sustainable rural development should be announced besides encouraging communication and cooperation, international and within the country, in agricultural research, extension and development. The new and cost effective technology at reasonable prices should be made available. The research institutes should focus for the development of new high yielding and more qualitative varieties and this required more investment on research related activities. It is very difficult to increase rice production horizontally because of non-availability of fertile land; hence the only solution is vertical increase in its production. For this purpose the availability of irrigation water throughout rice growth period must be ensured by constructing new water reservoirs. Such steps would be very useful to create a sense of pride and protection in farmers. As a result they would be able to devote and exert their full efforts to get maximum rice production which ultimately will increase their confidence about future of this valuable crop.

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REFERENCES

[1] Nasiruddin, M and R.C. Roy. Rice field insect pests during the rice growing seasons in two areas of Hathazari, Chittagong. Bangladesh Journal of Zoology. Vol.40 No.1 2012, pp. 89-100.

[2] Akram, M., A. Rehman, M. Ahmad and A.A. Cheema. Evaluation of rice hybrids for yield and yield components in three different environments.Journal of Animal and Plant Sciences. Vol.17 No.3-4 2007, pp. 70-75

[3] Memon, N.A. (2013). Rice: Important cash crop of Pakistan. [Online]. Available: http://www.foodjournal.pk/Sept-Oct-2013/Sept-Oct-2013-PDF/ Exclusive-article-Rice.pdf

[4] Pakistan Bureau of Statistics. (2014). Agricultural statistics of Pakistan.Area and production of important crops.[Online]. Available: http://www.pbs.gov.pk/sites/default/files/tables/area_production _crops_0.pdf.

[5] Pakissan. (2011). All About /Crop/Rice. [Online].Available: http://www.pakissan.com/english/allabout/crop/rice.shtml

[6] Asghar, M., M. Arshad, M. Fiaz, A. Suhail and A. M. Sabir. A survey of rice farmers' farming practices posing threats to insect biodiversity of rice crop in the Punjab, Pakistan. International Journal of Biodiversity and Conservation. Vol. 5 No.10 2013, pp. 647-654.

[7] Fujisaka, S. What does build research on farmer practice mean? Rice crop establishment (beusani) in eastern India as an illustration.Agriculture and Human Values. Vol.8 No.1-2 2005, pp. 93-98.

[8] Robinson, E.J.Z., S.R. Das and T.B.C. Chancellor. Motivations behind farmers' pesticide use in Bangladesh rice farming. Agriculture and Human Values. Vol. 24 No.3 2007, pp. 323-332.

[9] Suhail, A., M. Asghar and M. Arshad. *Insect faunal biodiversity associated with rice in Pakistan, with particular reference to rice black bug*. In: Ravindra, C.J., T.B. Alberto and S.S. Leocadio (eds.). Rice black bugs taxonomy, ecology, and management of invasive species. Philippine Rice Research Institute (PhilRice) 2007, pp.643-652.

[10] Patton, M.Q., *Qualitative evaluation and research methods*, 2nd Edition. Newbury Park: CA: Sage Publication. 1990, pp.169-186.

[11] Sheikh A.D, M.A. Mahmood, A. Bashir, M. Kashif. 2006. Adoption of rice technological package by the farmers of irrigated Punjab. Journal of Agricultural Research.Vol. 44 No. 4 2006, pp.341-352.

[12] Abdullah, M., L.I. Cuixia, S. Ghazanfar, A. Rehman, B. Ghazanfar and S.Saud. Problems faced by rice growing farmers and their behavior to the government policies: a case from Pakistan. Journal of Biology, Agriculture and Healthcare.Vol. 3 No.16 2013, pp.1-9.

[13] Weir, S. The Effects of education on farmer productivity in rural Ethiopia. CSAE working paper series, center for the study of African economies, University of Oxford,UK, (1999).

[14] Iqbal, M., M.A. Khan and M. Ahmad. Adoption of recommended varieties: a farm level analysis of wheat growers in irrigated Punjab. The Pak. Dev. Rev., Vol. 41 No.1 2002, pp.29-48

[15] Abedullah, S. Kouser and K. Mushtaq. Analysis of technical efficiency of rice production in Punjab (Pakistan): Implications for future investment strategies. Pak. Econ. Social Rev. Vol. 45 No.2 2007, pp. 231-244.

[16] Agree. (2014). Attract Young People to Food and Agriculture. [Online]. Available: http://www.foodandagpolicy.org/sites/default/files/AGree_Attract-Young=People-to_Food-and-Ag_2013%20Positions.pdf

[17] Mironga J.M. Effect of farming practices on wetlands of Kissii district, Kenya. Appl. Ecol. Environ. Res. Vol.3 No.2 2005, pp. 81-91.

[18] Sheikh A.D, M.A. Mahmood, A. Bashir and M. Kashif. 2006. Adoption of rice technological package by the farmers of irrigated Punjab. J. Agric. Res. Vol. 44 No.4 2006, pp. 341-352.

[19] Mukherjee A., Borad C.K., AsnaniM.V .Process documentation research on patteren of pesticide use in India.Zoo' Print J. Vol. 21 No.2 2006, pp.2489-2494.

[20] Lsuagcenter. (2013). Some farmers satisfied, others frustrated with 2012 rice crop: in Louisiana Rice Research Board Annual Report. [Online].Available:http://www.lsuagcenter.com/en/crops_livestock/crops/rice/Rice+Research+Boad +Reports/Some-farmers-satisfied-others-frustrated-with-2012-rice-crop.htm

[21] Gaytancioglua, O and H. Surekb. (2000). Input use and production cost in rice cultivation in Turkey. FAO corporate document repository. [Online]. Available: http://www.fao.org/docrep/x7164t/x7164t06.htm

[22] NNT. (2014). Rice farmers's satisfaction with NCPO's economics team. [Online]. Available: http://thainews.prd.go.th/CenterWeb/NewsEN/NewsDetail? NT01_NewsID=WNEVN5706090010001#sthash.uclL4zEM.dpuf

[23] Petchanet, P. (2013). Rice pledging can boost farmers' incomes and will be continued, commerce minister vows. [Online]. Available: http://www.nationmultimedia.com/business/Rice-pledging-can-boost-farmers-incomes-and-will-b-30215649.html

[24] Khan, A.H. (2009). Support price for wheat. [Online].Available:http://www.nust.edu.pk/INSTITUTIONS/Schools/S3H/Departments/Economics/Faculty/Pages/NEWS%20Paper%20Articles/2009/Oct2009/Support%20Price%20of%20Wheat%20-%2006%20Oct,%202009.pdf).

[25] Esmaeil, F and G. N. Sepide. Identifying and ranking the effective factors on farmers' satisfaction of rice crop insurance in Mazandaran province; the application of analytical hierarchy process approach. J.Agric.Econ.Res.,Vol. 6 No.1 2014, pp.131-153.

[26] Khan, F.Z.A., M.Sagheer, M.Hasan, H.T.Gul, F. Hassan, S.A. Manzoorand A. Wahid. 2013. Agricultural dynamics in Pakistan: current issues and solutions. Russ. J. Agric. Socio-Econo. Sci., Vol. 8 No.20 2013, pp.20-26.

[27] Khan, A.F. (2010). Can the role of middleman be eliminated? [Online].Available: http://www.archives.dawn.com/archives/154876).

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