Indian Journal of Extension Education
Vol. 53, No. 2, 2017 (11-17)

Agricultural Information Needs and their Fulfillment as Perceived by the Farmers in Changing Agricultural Scenario in Maharashtra

Awatade Sudarshan Chandrakant[1], Souvik Ghosh[2] and R B Singandhupe[3]

ABSTRACT

Nowadays, there are numerous extension agencies that are providing agricultural extension services to the farmers in the form of information and service support but the results are still not satisfactory in accordance with need fulfillment of farmers in the context of changing agricultural scenario in Maharashtra state. Hence, present study was aimed to assess diverse information needs of farmers from agricultural extension system. It was conducted in Yavatmal district of Maharashtra that included a random sample of 80 farmers, 20 each from four randomly selected villages representing two blocks. The present study reveals that soil, weather and climate, nutrient management, market prices and income generating activities are the prime needed aspects related to agricultural inputs with mean need perception score more than 3.5 on four point continuum scale followed by livelihood diversification, agricultural marketing, seeds, agri-entrepreneurship, subsidies, plant protection material, weed management, pest and disease management and crop diversification had mean need perception score more than average (>2.5) on four point continuum scale. However, the most of the information needs were fulfilled partially as opined by the farmers. The low perception of felt needs of the farmers on post harvest management and higher need perception on marketing aspects clearly indicated the fact of unwillingness and ignorance on value addition, quality control, *etc.* of agricultural produce and preference of marketing the produce as quickly as possible. However, the farmers expressed their interest in capacity building aspects *viz.* diversification of livelihood, agri- entrepreneurship and crop diversification by growing high value crops.

Key words: Agricultural extension system, farmers' information needs, need perception, need fulfillment, current agricultural changes .

INTRODUCTION

In many countries, extension is currently called as rural advisory services. According to the Global Forum for Rural Advisory Services, extension also called rural advisory services, as consisting of all the different activities that provide the information and services needed and demanded by farmers and other actors in rural settings to assist them in developing their own technical, organizational and management skills and practices so as to improve their livelihoods and well-being (GFRAS, 2010; Sulaiman, 2012).

Extension in today's Indian context includes all those agencies in the public, private, NGO and community based initiatives that provide a range of agricultural advisory services and facilitate technology application, transfer and management. While public sector line departments, mainly the Department of Agriculture was the main agricultural extension agency in the 60's and 70s, which carried the bandwagon of Green Revolution on its shoulder. But some constraints like (i) top-down approach (ii) being commodities and supply-driven specific (iii) lack of farming system approach (v) weakening research-extension linkages (vi) little focus on empowering farmers (vii) accountable to government than farmers (viii) co-mingling of government schemes and extension activities (ix) inadequate operating resources and financial sustainability and (x) little donor support for extension has dragged agriculture extension to high level of scrutiny with the end of the T&V (Training and Visit) system of extension in early 1990's (Babu *et al.,* 2013; Sulaiman, 2012; Sontakki *et al.,* 2010; Joshi *et al.,* 2005; Swanson and Mathur, 2003). However, the economic and agricultural environment has considerably changed since then, the Indian agriculture is facing numerous emerging challenges too, like slackening growth in rainfed area, declining average farm size, declining land and water resource base for an average farm size, wide gap in yield potential and national average yields of most

[1.] Ph. D Scholar, [2.] Professor and Head, Department of Agricultural Extension, Institute of Agriculture, Visva-Bharati University, Sriniketan, West Bengal , [3.] Principal Scientist (Agronomy), Central Institute for Cotton Research, Nagpur, Maharashtra.

commodities, diversification of agriculture towards high value commodities, higher cost for technologies/ services due to liberalization and participation of private sector in agricultural R&D (Research & Development) resulted in restricted access and being bypass of small and marginal farmers (Sulaiman, 2012) who constitutes over 80 per cent of farming households in India (Census, 2011).

In present liberalised trade and market regime, farmers are also exposed to price volatility sometimes even less than minimum support price (MSP) for crop like pigeon pea just because of fluctuations in domestic production and wide fluctuations in international prices (NITI Aayog, 2016). Besides that the country is also experiencing more hazardous climatic changes, such as higher temperature, intense rain and strong wind, intense lightning, drought and changes in timing of rain which has already affected agriculture and food productivity (Gupta, 2016) resulted in visibly less impressive and fairly unstable agricultural growth ranging from 5.8 per cent in 2005-06 to 0.4 per cent in 2009-10 and -0.2 per cent in 2014-15 (MoA, 2015). These sudden changes in agriculture environment with repeated crop failures, poor extension-farmers linkages and variance in agricultural growth along with increased in cost of production by way of farm inputs followed with very low market price has an impact on farm income as well as farmer's ability to take credit for investing in their land holdings. Hence the farmers get driven to debt trap and have caused distress leading suicide in the country (Behere and Behere, 2008; Mohanty, 2001).Total of 296438 have committed suicide in India since 1995 to 2016. According to NCRB in the year 1995 to 2016, 60750 suicides were in Maharashtra, where the worst position of the farmers was in Vidarbha region which is well known as cotton belt of Maharashtra (Mishra, 2016; Parvathamma, 2016). Some primary causes behind this picture are reported as stagnation in agriculture, marketing risks (e.g. drastic fall in market price sometime below MSP), collapse of extension system, growing institutional vacuum and lack of livelihood opportunities. The challenge is to improve the accessibility of farmers to information and its relevance in the agricultural development (Sharma, 2002).

The emerging information requirement is demand-driven, as opposed to supply-led public extension system during the green revolution era. Today, the farmers are increasingly looking for frequent interactions with various information sources not only to carry out their farming and marketing tasks efficiently but also to ensure delivery of safe and quality agricultural products to consumers (Adhiguru, 2009). To meet farmers changing need for information and advisory support (Van den Ban, 1998), extension should engage with a wide range of issues related to agriculture. This includes markets, credit and insurance, in addition to technology and research services and making arrangements for the supply of inputs. Along with this the farm family not only requires agricultural development support but also the support for diversified livelihoods for that there is a need to restructure government extension machinery with a new set of operational procedure with more flexible approach to meet the emerging needs of farmers at local level (Ghosh, 2012). However several initiatives have been taken by the government of India in the context of agricultural extension but the on-going reform process is yet to make a significant impact on improving extension's contribution to agricultural development. It can be achieved only after a much stronger research support to extension to address the needs of small farmers and disadvantaged regions which is argued as one of the areas of priority attention (Sulaiman, 2012).

In this context, it was felt important to assess the agricultural information needs of the farmers and their fulfillment in Maharashtra state.

METHODOLOGY

The state of Maharashtra was purposively selected for present study because of changing agricultural scenario, wide and uneven distribution of farmers as well as extension sources across the districts in the state. The major area of Vidarbha region has basically low rainfall area; reported maximum numbers of suicide creates an interest to select the region as a study area. Cotton, Soybean and Pulses were majorly cultivated crop in randomly selected Yavatmal district located in Vidarbha region. Based on multistage random sampling procedure, two villages from each of two blocks (*i.e.* Darwha and Pusad) and 20 farmers from each of the four selected villages were chosen as respondents of present study that covered a total of 80 farmers as respondents.

Information needs related to agricultural inputs considered with respect to labours, seeds, fertilisers, irrigation, plant protection and implements & equipments. Agricultural finance needs concerned to loans/ credits, subsidies and insurance. Needs of the farmers related to agricultural production included information on soil, weather and climate, land preparation, sowing and transplantation, weed management, nutrient management, pest and disease management and harvesting. Farmers' needs with respect to post-harvest management concerned with processing, value addition, storing, grading and packaging. Market related information needs were pertaining to market

survey, marketing channels and marketing prices. Information needs for livelihood diversification of farmers took into consideration of information related to agricultural diversification, crop diversification (high value crops), integrated farming system, agri-entrepreneurship, income generation activities, etc. Needs for capacity building or training was also evaluated on the basis of farmers perceptions with respect to i) efficient use of agricultural inputs like labours, seeds, fertilizers, irrigation, plant protection and implements &equipment, ii) agricultural finance related issues such as Kisan Credit Card (KCC), crop insurance and subsidies, iii) crop production technology and management aspects viz. soil health management, land preparation, sowing and transplantation, nutrient management, weed management, pest and disease management and techniques and methods for harvesting, iv) post harvest activities like processing, value addition, storing, grading and packaging, v) marketing aspects, and vi) livelihood diversification options.

Assessment of the agriculture related information needs and needs for capacity building /training of the farmers was done on the basis of needs perceived and needs fulfilled, both on a 4-point continuum scale. Respondents were asked to indicate, for the perceived needs related to farming on a scale of rare (1), sometimes (2), often (3) and most often (4); while the needs fulfilled was as rarely (1), somewhat/partially (2), almost (3) and full extent (4).

RESULTS AND DISCUSSION

The farmers use to feel the need of information and communication support from agricultural extension system for their farming that includes the various types of needs related to agricultural inputs, agricultural finance, agricultural production, post-harvest management, marketing of agricultural produce, diversification of livelihood options, capacity building or training on different aspects of farming, *etc.* Therefore, present study was aimed to assess such needs of the farmers and the extent of fulfillment of those needs based on the perceptions of a random sample of 80 farmers in Yavatmal district of Maharashtra.

As far as the distribution of respondents with respect of information needs related to agricultural input is concerned, Table 1 shows that the perception of the farmers with respect to seeds was maximum (mean perception score of 2.99) followed by plant protection material, fertilizers, irrigation, implements and equipments and labours with mean perception scores of 2.69, 2.48, 2.23, 1.90 and 1.44, respectively. This finding is quite similar to the findings of Adhiguru (2009) and Bachhav (2012) who reported that majority of the farmers need information on availability of seeds (74.29 %) crop production (70.86 %) and insecticide availability (62.29 %) followed by fertilizer availability (64.58 %). In present study among the listed six information needs related to agriculture input only seeds and plant protection material needs were found with mean perception score more than average (>2.5) whereas remaining others were recorded less than average (<2.5) on 4- point continuum scale. The farmers' perception was relatively more varied as observed from standard deviation value in case of implements and equipments (0.56) followed by seeds, fertilizers, irrigation and labour (0.51, 0.48, 0.37 and 0.32 respectively) whereas in case of plant protection material majority were quite same in their perceptions with lowest standard deviation value (0.27). Perceived needs are completely fulfilled in all the aspects except in case of seeds (mean need fulfillment score 2.69 against need perceived score 2.99) which is one of the mostly perceived information needs by the farmers.

Table 1: Information needs related to agricultural inputs and extent of their fulfillment as perceived by the farmers in Yawatmal district of Maharashtra

Information needs related to agricultural inputs	Mean perception score (SD)	
	Need perceived	Need fulfilled
Labours	1.44 (0.32)	2.95 (0.49)
Seeds	2.99 (0.51)	2.69 (0.53)
Fertilizers	2.48 (0.48)	2.94 (0.49)
Irrigation	2.23 (0.37)	2.52 (0.85)
Plant protection material	2.69 (0.27)	2.95 (0.34)
Implements and equipments	1.90 (0.56)	3.19 (0.61)

Note: SD stands for standard deviation value; minimum and maximum possible scores are 1 and 4 respectively

It is evident from the Table 2 that farmers in Yavatmal district more varied in their perceptions towards the information needs related to agricultural finance. The mean perception score in case of insurance was highest followed by subsidies and loans/ credits with mean perception score of 3.85, 2.73 and 2.35 respectively. The fulfillment of information need in case of insurance recorded maximum (3.71), followed by loans/ credits, while the information needs related to subsidies was noted with wide gap between need fulfilled (2.36) against need perceived (2.73). The farmers were diversely opined for need fulfillment with respect to all aspects of agricultural finance as observed from the standard deviation values. This finding is similar to the Ministry of Agriculture & Farmers Welfare (2017) report which mentions that most of the farmers of Maharashtra insured under Prime Minister Fasal Bima Yojana (PMFBY) and Restuctured Weather based Crop Insurance Scheme (RWBCIS) (combined) during Kharif 2016, hence it is

one of the top 10 States in terms of number of farmers insured under PMFBY.

Table 2: Information needs related to agricultural finance and extent of their fulfillment as perceived by the farmers in Yawatmal district of Maharashtra

n= 80

Information needs related to agricultural finance	Mean perception score (SD)	
	Need perceived	Need fulfilled
Loans/ credits	2.55 (0.47)	2.50 (0.59)
Subsidies	2.73 (0.29)	2.36 (0.50)
Insurance	3.85 (0.47)	3.71 (0.72)

Note: SD stands for standard deviation value; minimum and maximum possible scores are 1 and 4 respectively

The data presented Table 3 shows the importance of information needs of farmers related to agricultural production aspects and extent of their fulfillment as perceived by the farmers in Yavatmal district. The most needed aspect was weather and climate followed by soil and nutrient management with mean perception score was >3.50 on a four point continuum scale.Whereas, other aspects like weed management and pest and disease management were also felt important by the farmers as recorded mean perception score more than the average (>2.5) but with diverse opinions as the standard deviation values observed to be quite high (0.55 and 0.42). Contrastingly, remaining aspects *viz.* sowing and transplantation, harvesting and land preparation were recorded with mean perception score less than average (<2.5). It is quite surprising to note here that all perceived needs are getting fulfilled with mean score for need fulfilled more than the average (>2.5) on four point continuum scale except for soil testing and nutrient management (1.74 and 2.30 respectively). Farmers are varied in their expression for the fulfillment of need in both soil testing and nutrient management as observed from higher standard deviation value (0.71 and 0.67 respectively). The vast gap between mean score for needs fulfilled (1.74) against needs perceived (3.71) represents the scenario of poor linkages between farmers-extension for provision of extension services with respect to most important aspects in agriculture production like soil testing followed by nutrient management (2.30 against 3.67), weather and climate (2.89 against 3.77) and weed management (2.58 against 2.91).

Table 3: Information needs related to Agricultural production and extent of their fulfillment as perceived by the farmers in Yawatmal district of Maharashtra

n= 80

Information needs related to Agricultural production	Mean perception score (SD)	
	Need perceived	Need fulfilled
Soil	3.71 (0.26)	1.74 (0.71)
Weather and climate	3.77 (0.29)	2.89 (0.53)
Land preparation	0.94 (0.31)	2.70 (0.82)
Sowing and transplantation	1.69 (0.38)	3.61 (0.39)
Weed management	2.91 (0.55)	2.58 (0.39)
Nutrient management	3.67 (0.32)	2.30 (0.67)
Pest and disease management	2.87 (0.42)	3.19 (0.42)
Harvesting	1.52 (0.22)	3.56 (0.31)

Note: SD stands for standard deviation value; minimum and maximum possible scores are 1 and 4 respectively

The new economic era in India influences the shift of agriculture from traditional agriculture towards agri-business, which brought paramount importance to post harvest management of agricultural produce. Therefore, need of farmers related to post harvest management of agricultural produce was assessed on different aspects such as processing, value addition, storing, grading and packaging. It is evident from the Table 4 that the farmers of Yavatmal district perceived the information needs on post harvest management aspects comparatively lowly (mean perception score <2.5). Among the five aspects, grading is felt relatively highly needed followed by storing, processing, value addition and packaging. Farmer's perceptions were more diversified in all aspects except packaging as indicated through relatively higher standard deviation values. All the perceived needs were completely fulfilled as opined by the farmers except processing with mean score for needs fulfilled (1.10) against needs perceived (1.32) and value addition with mean score for needs fulfilled (1.03) against needs perceived (1.24). The low perception of felt needs of the farmers on post harvest management clearly indicates the fact of unwillingness and/or ignorance on value addition, quality control, *etc* of agricultural produce and preference of marketing the raw farm produce.

Table 4: Information needs related to Post harvest management and extent of their fulfillment as perceived by the farmers in Yawatmal district of Maharashtra

n= 80

Information needs related to Post-harvest management	Mean perception score (SD)	
	Need perceived	Need fulfilled
Processing	1.32 (0.82)	1.10 (0.34)
Value addition	1.24 (0.77)	1.03 (0.15)
Storing	1.35 (0.55)	1.55 (0.77)
Grading	1.52 (0.84)	1.55 (0.65)
Packaging	1.03 (0.11)	2.12 (0.45)

Note: SD stands for standard deviation value; minimum and maximum possible scores are 1 and 4 respectively.

Table 5 depicted that the farmers of Yavatmal district are very much concerned about market prices among all the market issues as evident from its highest mean perception score (3.54) followed by market survey and marketing channels both with mean perception score greater than average (>2.5) on four point continuum scale. Only the information needs related to marketing channels were completely fulfilled whereas extension needs related to market prices and market survey were having gap between need perceived and needs fulfilled. In case of market prices, mean score for needs fulfilled is found 2.89

against mean score for needs perceived 3.54. Similarly, in case of market survey mean score for needs fulfilled is 2.04 against mean score for needs perceived 2.77. This emphasizes the necessity of market led extension approach in present picture of market liberalization where the farmers are very much concern about better market prices for their agricultural produce.

Table 5: Information needs related to marketing and extent of their fulfillment as perceived by the farmers in Yawatmal district of Maharashtra

n= 80

Information needs related to Marketing	Mean perception score (SD)	
	Need perceived	Need fulfilled
Market survey	2.77 (0.35)	2.04 (0.63)
Marketing channels	2.68 (0.33)	3.91 (0.14)
Market prices	3.54 (0.38)	2.89 (0.62)

Note: SD stands for standard deviation value; minimum and maximum possible scores are 1 and 4 respectively.

It is evident from the Table 6 that the farmers mostly perceive the information needs on income generating activities (mean perception score 3.68), followed by agri-entrepreneurship, crop diversification and agricultural diversification all of which with mean perception score greater than average (>2.5).

None of the aspects related to livelihood diversification were opined by the farmers as completely fulfilled against perceived extension needs. Income generating activities showed highest gap between needs perceived (3.68) and needs fulfilled (1.09), followed by agri-entrepreneurship, crop diversification, agricultural diversification and integrated farming. In this context entrepreneurship development by the farmers is inevitable in time to come for paradigm shift from subsistence agriculture to agri-business.

The extension organizations need to focus on this issue taking into the consideration of new economic reforms and its impact on Indian farmers. Farmers have perceived information needs mostly in favor of diversifying their livelihoods through various options viz. agricultural diversification, crop diversification by growing high value crops, integrated farming, agri-entrepreneurship and income generating activities.

This finding is quite important in the context of the findings of Behere and Behere (2008), which mentions that if given an option, 40 per cent farmers opined that they would like to quit agriculture because of low income and non-remunerative nature.

Table 6: Information needs related to livelihood diversification and extent of their fulfillment as perceived by the farmers in Yawatmal district of Maharashtra

n= 80

Information needs related to livelihood diversification	Mean perception score (SD)	
	Need perceived	Need fulfilled
Agricultural diversification	2.73 (1.16)	1.42 (0.83)
Crop diversification (high value crops)	2.84 (1.19)	1.37 (0.66)
Integrated farming	2.43 (1.14)	2.00 (1.11)
Agri-entrepreneurship	2.91 (0.95)	1.16 (0.61)
Income generating activities	3.68 (0.47)	1.09 (0.40)

Note: SD stands for standard deviation value; minimum and maximum possible scores are 1 and 4 respectively.

Table 7 showed the perceptions of sampled farmers (80) in Yavatmal district regarding needs for capacity building/ training. The most needed aspect was training on livelihood diversification options (2.51) followed by crop production technology and management aspects (2.20) and training on efficient use of agricultural inputs (1.61). Other aspects *viz.* training on post harvest activities, training on marketing aspects and training on financial issues were also felt needed by the farmers but with very low mean perception scores 1.14, 1.11 and 1.00 respectively. All of the aspects were fulfilled to minimum level leaving the gap in need perceived and need fulfilled with respect to all aspects of capacity building of farmers. The farmers were having varied perceptions on information needs for most of the aspects of capacity building of farmers as observed from standard deviation values.

Table 7: Information needs related to capacity building/ training and extent of their fulfillment as perceived by the farmers in Yavatmal district of Maharashtra

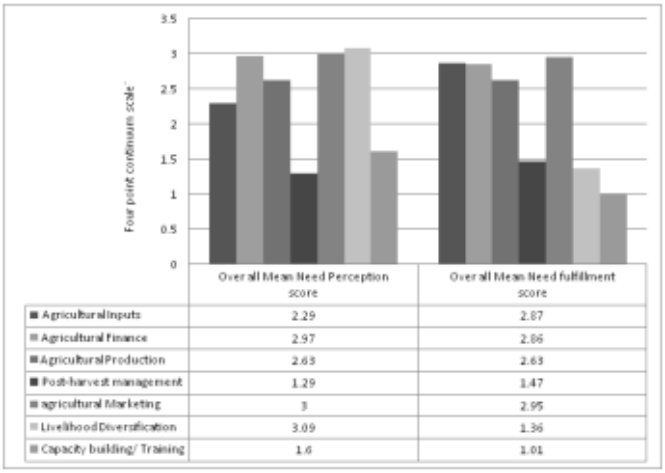
n= 80

Information needs related to capacity building/ training	Mean perception score (SD)	
	Need perceived	Need fulfilled
Training on efficient use of agricultural inputs	1.61 (0.39)	1.00 (0.00)
Training on agricultural finance issues	1.00 (0.040	1.00 (0.00)
Crop production technology and management aspects	2.20 (0.39)	1.03 (0.16)
Training on post harvest activities	1.14 (0.40)	1.04 (0.15)
Training on marketing aspects	1.11 (0.58)	1.00 (0.00)
Training on livelihood diversification options	2.51(0.55)	1.00 (0.00)

Note: SD stands for standard deviation value; minimum and maximum possible scores are 1 and 4 respectively.

The farmers of Yavatmal district of Maharashtra were having diversified perceptions on information needs perceived by them for many aspects in agriculture as depicted in Fig. 1. Maximum overall mean needs perception score was observed with livelihood diversification (3.09) followed by agricultural marketing (3.00), agriculture finance (2.97), agricultural production (2.63), whereas other remaining aspects recorded with

over all mean perception score less than average (<2.5) on four point continuum scale. Among the seven aspects of agriculture only three were opined completely fulfilled by the farmers all of which are core important aspects of agriculture *viz*. agricultural inputs, agricultural production and post-harvest management, whereas remaining four aspects namely livelihood diversification, capacity building/ training, agricultural finance and agricultural marketing observed with gaps between extension needs to be fulfilled and extension needs to be perceived. The wide gap was observed with respect to livelihood diversification as overall mean perception score for needs fulfilled is found 1.36 against mean perception score for needs perceived 3.09.



	Over all Mean Need Perception score	Over all Mean Need fulfillment score
Agricultural Inputs	2.29	2.87
Agricultural Finance	2.97	2.86
Agricultural Production	2.63	2.63
Post-harvest management	1.29	1.47
agricultural Marketing	3	2.95
Livelihood Diversification	3.09	1.36
Capacity building/ Training	1.6	1.01

Fig. 1 Differential perceptions of farmers on information needs perceived and fulfilled with respect to various aspects of agriculture in Yavatmal district of Maharashtra

CONCLUSION

The diverse information needs of farmers in the context of changing agriculture scenario are explored along with the understanding of level of need perception and need fulfillment. The present study reveals that soil, weather and climate, nutrient management, market prices and income generating activities are the prime needed aspects related to agricultural inputs with mean need perception score more than 3.5 on four point continuum scale followed by livelihood diversification, agricultural marketing, seeds, agri-entrepreneurship, subsidies, plant protection material, weed management, pest and disease management and crop diversification had mean need perception score more than average (>2.5) on four point continuum scale with partial fulfillment. It is worth mentioning that today where pluralistic extension service providers are engaged in offering diverse kinds of information and service support to farmers' the results are still not satisfactory in accordance with fulfilment of their needs related to various aspects of farming from extension services. Hence, convergence of extension agents is necessary to avoid duplication and dilution of efforts. It is essential to route all the agriculture related information and services through a single agency that can reach at local level for effective utilization of crucial resources through ICT. This is quite natural as majority of the farmers from this region are in distress, faced repeated crop failures that has made their livelihood difficult to rely on only one option for income. In this context, the building social capital through scaling up of farmers interest groups (FIGs), self help groups (SHGs) and Farmers Associations (FAs) could be an effective mechanism for empowerment and transfer of agricultural technologies with reduction in extension cost and the workload of extension functionaries. The findings of present study reiterates redesigning of operational procedures of extension functionaries with more flexible approach to meet the emerging needs of farmers at local level.

Paper received on : May 05, 2017
Accepted on : May 11, 2017

REFERENCES

Adhiguru, P., Birthal, P. S. and Ganesh Kumar, B. 2009. Strengthening pluralistic agricultural information delivery systems in India. *Agricultural Economics Research Review,* 22, 71–79.

Babu, S.C., Glendenning, C.J., Asenso-Okyere, K. and Govindarajan, S.K. 2012. Farmers' Information Needs and Search Behaviours — A Case Study in Tamil Nadu, India, IFPRI Discussion Paper 01165, International Food Policy Research Institute, Washington, DC, USA.

Babu, S., Joshi, P. K., Gledenning, C. J., Okyere, K. A. and Sulaiman, R. V. 2013. The state of Agircultural Extension Reforms in India: Strategic Priorities and Policy Options, *Agricultural Economics Research Review,* 26 (2) July-December 2013 pp. 159.

Bachhav, N.B. 2012. Information Needs of the Rural Farmers : A Study from Maharashtra, India: A Survey, *Library Philosophy and Practice (e-journal).* Paper 866.

Behere, P. B. and Behere, A. P. 2008. Farmers suicide in Vidarbha region of Maharashtra state: A myth of reality? *Indian Journal of Psychiatry,* 50 (2), 124-127.

Census 2011, Retrieved from GFRAS. 2010, Five Key Areas for Mobilising the Potential of Rural Advisory Services, Policy Brief No1, available Mobilizing-potential-of-RAS_web.pdf.

Ghosh, S. 2012. Innovations in public sector-led agricultural extension, Scientific Research and Essays, 7 (49), 4170-4175.
Gupta, S., Sen, P. and Verma, S. 2016. Climate change and Production Risk: Evidence from Indian Agriculture.

Joshi, P.K., Pal, S., Birthal, P.S. and Bantilan, M.C.S. 2005. Impact of Agricultural Research: Post Green Revolution Evidence from India, NCAP/ICRISAT, New Delhi.

Ministry of Agriculture 2015Agricultural Statistics at a Glance Ministry of Agriculture & Farmers Welfare (2017), State-wise details of farmers covered under Pradhan Mantri Fasal Bima Yojana (PMFBY) and Restructured Weather Based Crop Insurance Scheme (RWBCIS) (combined) during Kharif 2016.

Mishra, S. 2016. Report on Suicides of farmers in Maharashtra, IGIDR, Mumbai, Jan-2016.

Mohanty, B. B. 2001. Suicides of farmers in Maharashtra: A Socio-economic Analysis', *Review of Development and Change,* 6 (2).

NITI Aayog. 2016. Evaluation Report on Efficacy of Minimum Support Prices (MSPs), http://www.niti.gov.in/writereaddata/files/document_publication/MSP-report.pdf.

Parvathamma, G. L. 2016. Farmers Suicide and Response of the Government in India- An Analysis. *IOSR Journal of Economics and Finance (IOSR-JEF),* 7, 01-06.
Sharma, V.P. 2002. Cyber Extension: The Extension Approach for New Millennium, Available at: http://www.manage.gov. i n / m a n a g e l i b / f a c u l t y /VPSharma.html

Sontakki, B. S., Samantha, R. K. and Joshi, P. K. 2010. Redesigning Agricultural Extension in India: Challenges and Opportunities, Summary proceedings and recommendations of NAARM-IFRI workshop held during 20-21 August 2010. National Academy of Agricultural Research Management, Hyderabad, Andhra Pradesh.

Sulaiman, R. V. 2012. Agricultural Extension in India: Current status and Ways Forward. Background paper prepared for the Roundtable consultation on Agricultural Extension, Beijing, March 15-17, 2012.

Swanson, B.E. and Mathur, P. N. 2003. Review of the Agricultural Extension System in India, The World Bank: Washington DC.

Van den Ban, A.W. and Hawkins, B.S. 1998. Agricultural Extension, Oxford: Blackwell Science Publishers.