Impact of mobile phone based agro-advisories on knowledge of sunflower (*Helianthus annuus* L.) farmers'

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ABSTRACT

The productivity of *rabi* sunflower (*Helianthus annuus* L.) is low in Andhra Pradesh (892 kg/ha). In order to achieve higher productivity of sunflower, farmers need to access a wide range of information related to production technologies, post-harvest processes, remunerative markets, credit and weather. The increasing penetration of mobile phone networks and handsets in India presents an opportunity to make useful information more widely available and plays a significant role in technology transfer. This study was conducted with sunflower farmers of Mahaboobnagar district, Andhra Pradesh, India with the objectives of assessing the farmers preferred extension delivery methods, their needs and perceptions of use of mobile phones and the gain in knowledge on sunflower production technologies due to mobile phones. The knowledge scores showed significant differences between pre- and post-dissemination of messages over mobile phones, which indicated that substantial improvement in knowledge, is possible with the use of mobile phones as source of knowledge access.

Keywords: Agro-advisories, Dissemination, Oilseeds, Impact, SMSs, Text messages

Oilseed crops occupy 14% of gross cropped area of the country. These are cultivated in an area of 26.48 m. ha, with a production of 30.01 m. t (Directorate of Economics and Statistics, 2012). Oilseeds account for 1.4% of gross domestic product and 8% of value of all agricultural products. The *per capita* consumption of vegetable oil is rising continuously and is 14.2 kg/year in 2011-12 and would be around 16.38 kg/year by 2020. At present, the oilseeds production in India is not meeting the local demands and heavily dependent on imports. The reasons for low productivity are many and one of them is lack of access to knowledge on oilseed cultivation. To meet the challenges posed through huge demand for vegetable oils, the productivity has to be increased substantially. In Andhra Pradesh the productivity of *rabi* sunflower (*Helianthus annuus* L.) is around 892 kg/ha. The frontline demonstrations conducted in farmers fields indicated that the seed yield can be improved up to 1356 kg/ha (51% increase) (Kumar and Varaprasad, 2012) in sunflower. In order to achieve productivity improvement in sunflower, farmers need to access a wide range of information related to production technologies, post-harvest processes, remunerative markets, credit and weather. The National Sample Survey Organization results indicate that the main sources of information to farmers till today are neighbors, input dealers, radio, TV, news paper and extension worker.

The information and communication technologies (ICTs) play an important role in their endeavor of reaching the unreached farmers. The increasing penetration of mobile phone networks and handsets in India presents an opportunity to make useful information more widely available. The typical ICT tool *viz*., mobile phone with a subscriber base of more than 920 million and overall tele-density of 61.38 may play significant role in technology transfer. The studies conducted on the impact of mobile phone based dissemination in many countries indicted that adoption of mobile phones by fishermen and wholesalers was associated with a dramatic reduction in price dispersion, the complete elimination of waste, and near-perfect adherence to the law of one price. Both consumer and producer welfare increased (Jenson, 2007). Among the modern information and communication tools (ICTs) mobile telephony has been widely accepted mode of delivering information not only in India but also in other South Asian and African countries (Mittal, 2011). Mobile phone helps in accessing to valuable information on far away commodities. Mobile phone coverage and adoption have had positive impacts on agricultural and labor market efficiency and welfare in certain countries (Aker and Mibiti, 2010).

The present study was conducted with sunflower farmers of Mahaboobnagar district, Andhra Pradesh, with the objectives of assessing the farmers preferred extension delivery methods, their needs and perceptions of use of mobile phones and the gain in knowledge on sunflower production technologies due to mobile phones.

MATERIALS AND METHODS

The study used an expost facto and experimental designs for survey and knowledge dissemination, respectively. The villages were selected based on the highest area under sunflower and 120 registered respondents were selected by random sampling method. A scale was designed to measure farmers' perceptions of use of mobile phones. The scale consisted of 13 items and the responses were recorded on a five point continuum with scores 'strongly agree' = 5, agree = 4, undecided = 3, disagree = 2 and strongly disagree = 1. Before the start of the *rabi* season, (July-September, 2011) interviews were conducted with farmers to assess their level of knowledge. During *rabi*, 2011-12, knowledge on sunflower production technologies was disseminated through text and audio messages. The SMSs were sent to farmers in regional language (telugu) through National Informatics Centre server and the audio messages were sent in regional language through IFFCO Kisan Sanchar Limited. The text and audio messages were disseminated four times a week during the season. After the end of the season during March-April, 2012, the knowledge of farmers was assessed with the help of semi-structured telephone and personal interviews. The details of text and audio messages are as follows:

Items	Text messages	Audio messages	No. of farmers
Pre-sowing	8	6	120
Sowing and production	15	12	120
Plant protection	8	6	120
Harvest and post harvest management	5	4	120
Total	36	28	-

An interview schedule was developed and validated by field data. SAS software was used to analyze descriptive statistics such as frequency, mean, per cent and paired t test. McNemar test was used to test the effectiveness of mobile phone based dissemination (pre- and post-) as the data is mostly at nominal level of measurement.

RESULTS AND DISCUSSION

The results showed that majority of farmers (95.8%) preferred personal contacts followed by exposure visits to institutions (93.3%) and training by research organizations (91.7%). More than 70% of farmers preferred mobile phones as an extension delivery method. Meetings were the least preferred extension methods for the farmers (Table 1). Venkattakumar and Padmaiah (2012) reported that television, FLD farmers, family members, researcher/ scientists, progressive farmers (*Adarsha Rythu*) and neighbours were the major sources of information for sunflower farmers. Farouque and Takeya (2009) reported that farm and home visit, neighbors, relatives/friends, result demonstration, field day, farmer field school, folk song, film and poster were the most preferred methods by small and marginal farmers. The medium and large categories of farmers, preferred mobile phones, office call, method demonstration, tour/excursions, group meetings, newspaper and television. Ammani *et al.* (2011) reported that T & V system is the most preferred (86% of respondents) extension delivery method followed by radio and television (23%), printed media (4%) and none of the farmers preferred mobile phones. These findings imply that farmers preferred diverse and multiple extension delivery methods.

Table 1 Farmers' preferred extension delivery methods

Method	%	Rank
Personal contact	95.8	I
On-farm demonstrations	16.7	XII
Local educational meetings	33.3	IX
Mandal educational meetings	16.7	XII
District educational meetings	8.3	XIII
News and reports through farm media	66.7	VI
Phone help lines	20.8	XI
Printed literature (bulletins/folders)	50.0	VII
Training by farm input dealers	41.7	VIII
Video films	25.0	X
Training by government departments	83.3	IV
Training by research organizations	91.7	III
Exposure visits to research farms	93.3	II
Exposure visits to successful farmers' fields	91.7	III
Rythu sadassu	25.0	X
Mobile phones	70.8	V

The data on farmers' perceptions of use of mobile phones indicated that farmers strongly agreed to the utility of mobile phones in networking with other farmers, scientists, extension workers and development personal (4.85), in getting useful, timely and basic information related to markets (4.50), weather (4.45), availability of inputs (4.02) and technical information on agriculture (3.95). They disagreed that use of mobile phones are costly and not affordable (1.30) and preferred over personal contacts (1.45) (Table 2).

The information needs of the sampled farmers were high for improved cultivars (86.7%), market prices (91.7%) and weather (83.3%), whereas, the information need was low for seed treatment and method of sowing (62.5% each), water management (45.8%), fertilizer management (50.0%), manual weed management (70.8%), herbicide application (90.0%), micro nutrient management (80.0), harvesting (84.2%), post-harvest management (82.5%) and farm implements (62.5%) (Table 3). Mittal *et al.* (2010) reported that information regarding seeds is the most frequently accessed information by farmers followed by mandi prices, plant protection and fertilizer application.

Table 2 Farmers' perceptions of use of mobile phones

Statement	Score
Entertainment purpose	3.62
Useful for social interactions	4.14
Costly and are not affordable	1.30
Useful in getting timely and needful information	4.28
Helps in getting basic information	4.50
Plays an important role in networking	4.85
Helpful in getting advance information on weather (rains)	4.45
Getting technical information on agriculture	3.95
Market prices	4.50
Enhancing the knowledge of farmers	3.52
Information on meetings and other extension related activities	3.54
Availability of seeds, fertilizers and chemicals	4.02
Preferred over personal contacts	1.45

Interpretive scales: 4.26-5.00 = strongly agree; 3.26-4.25 = agree; 2.26-3.25 = undecided; 1.26-2.25 = disagree; 1.25 or less = strongly disagree

The overall mean knowledge scores pre-dissemination (8.47) and post-dissemination (15.39) showed improvement, which was highly significant (t = 24.79). Significant improvements were observed in all individual knowledge items post-dissemination as compared to pre-dissemination of messages over mobile phones (Table 4).

Table 3 Information needs of oilseed growers

Information need	Number of respondents		
	High	Medium	Low
Cropping systems	82 (68.3)*	30 (25.0)	8 (6.7)
Improved cultivars	104 (86.7)	16 (13.3)	0
Seed treatment	20 (16.7)	25 (20.8)	75 (62.5)
Method of sowing	25 (20.8)	20 (16.7)	75 (62.5)
Irrigation and water management	45 (37.5)	20 (16.7)	55 (45.8)
Fertilizer management	35 (29.2)	25 (20.8)	60 (50.0)
Manual weed management	10 (8.3)	25 (20.8)	85 (70.8)
Herbicide application	5 (4.2)	7 (5.8)	108 (90.0)
Insect pest management	48 (40.0)	56 (46.7)	16 (13.3)
Disease management	65 (54.2)	51 (42.5)	4 (3.3)
Micro-nutrient management	6 (5.0)	18 (15.0)	96 (80.0)
Harvesting	7 (5.80	12 (10.0)	101 (84.2)
Post harvest management	8 (6.7)	13 (10.8)	99 (82.5)
Market prices	110 (91.7)	10 (8.3)	0
Weather forecast	100 (83.3)	20 (16.7)	0
Farm implements	15 (12.5)	30 (25.0)	75 (62.5)

*Figures in parentheses are percentages

Table 4 Farmers' knowledge pre- and post- dissemination of messages over mobile phones

Items	Farmers' knowledge (frequency and %)		Simple kappa coefficient	Mc Nemer test statistic
	Pre-	Post-		
Type of soils	64 (53.3)	81 (67.5)	0.31	35*
Preparatory cultivation	72 (60.0)	89 (74.2)	0.69	17*
Recommended cultivars	29 (24.2)	85 (70.8)	0.23	56*
Optimum time of sowing	83 (69.2)	91 (75.8)	0.67	4**
Recommended seed rate	28 (23.3)	76 (63.3)	0.30	48*
Recommended spacing	30 (25.0)	87 (72.5)	0.23	56*
Seed treatment	33 (27.5)	87 (72.5)	0.25	54*
Recommended fertilizers	43 (35.8)	89 (74.2)	0.33	46*
Time of application	31 (25.8)	88 (73.3)	0.22	57*
Application of S	13 (10.8)	48 (40.0)	0.31	35*
Application B	18 (15.0)	45 (37.5)	0.45	27*
Application Zn	12 (10.0)	35 (29.2)	0.43	23*
Chemical weed control	37 (30.8)	45 (37.5)	0.85	7*
Manual weed control	78 (65.0)	104 (86.7)	0.44	26*
Thinning	25 (20.8)	79 (65.8)	0.24	54*
Critical stages of moisture stress	64 (53.3)	75 (62.8)	0.81	11*
Management of insect pests	62 (51.7)	108 (90.0)	0.21	46*
Management of diseases	63 (52.5)	85 (70.8)	0.63	22*
Application of biological control agents	39 (32.5)	80 (66.7)	0.39	41*
Supplementary pollination methods	37 (30.8)	91 (75.8)	0.25	54*
Optimum time of harvesting	83 (69.2)	99 (82.5)	0.47	10.7*
Mechanical harvesting	24 (20.0)	88 (73.3)	0.17	63*
Sunflower thalamus as animal feed	49 (40.8)	92 (76.7)	0.35	43*

Figures in parentheses are percentages; * significant at < 0.01 level of probability ; ** significant at < 0.05 level of probability

The McNemer test values showed that maximum number of farmers gained knowledge on mechanical harvesting (63), followed by timely application of fertilizers (57), improved cultivars and recommended spacing (56 each), thinning, seed treatment and supplementary pollination (54 each). Labour scarcity in villages forced the farmers to look for alternate approaches such as mechanization for timely operations, which resulted in their interest and gain in knowledge. Farmers showed interest in improved cultivars and simple and 'low-cost/ no-cost' agronomic practices such as spacing and thinning which resulted in gain in knowledge. Less number of farmers gained knowledge of optimum time of sowing (4), chemical weed control (7), optimum time of harvesting (10.5), critical stages of moisture stress (11) and preparatory cultivation (17) as the sampled farmers already know these aspects. Kumar and Padmaiah (2012) reported significant improvements in knowledge of castor growers due to mobile based agro-advisories. Pawan Kumar (2011) reported that the information obtained through mobile phones improved soil health, which resulted in increased agricultural productivity and farm income. More than 75% of the farmers view mobile phone assisted services useful, the amount and quality of the services and the speed of services delivery have been improved significantly as a result of mobile phone intervention (Xiaolan Fu and Shaheen Akter, 2012). This clearly indicates the effect of mobile based dissemination in improving the knowledge of farmers.

Mobile phones can play an important role of creating awareness and increasing knowledge about improved technologies such as new cultivars, efficient management of weeds and insect pests, timely harvesting of the crop and value addition. Mobile phones are clearly not a substitute for human intermediation and the limits of stand-alone ICT initiatives should be clearly understood. Mobile based communication cannot solve the underlying institutional bottlenecks that constrain the extension agencies from interacting with farmers.

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