Readability of Literature Supplied with Plant Protection Chemicals

Basavaprabhu Jirli[1], Ram Jiyawan[2], Amit Kumar[3] and Sharada[4]

ABSTRACT

Printed materials have been accepted world wide as an important means of communication and have greater significance in the context of increased literacy level over the last few decades. The effectiveness of these printed materials depends largely on the extent to which they are readable. The present study was undertaken to analyze the readability of literature supplied along with plant protection chemicals. The study was conducted in Sevapuri block of Varanasi district of Uttar Pradesh, because this block has high literacy percentage in comparison to other blocks. Four villages under this block namely Maharajpur, Gaharpur, Jaddupur and Bhelupur were selected randomly for the study. A total of 110 farmers who grew varieties of cereals and vegetables and used Plant Protection Chemicals (PPCs) for protecting their crops from the incidence of insect-pests and diseases were the respondents of the study. The findings of the study revealed that majority of the farmers had completed their higher secondary education (61%). Further all the farmers said that they were aware about literature supplied with PPCs, but only 37 per cent of them read the literature. All the farmers agreed that too many technical words used, font size used, poor paper quality, lack of illustration and difficult to understand the application methods regarding PPCs suggested in the literature considered as main constraints in reading the literature. Hence readability constraints should be eliminated and farmers should be encouraged to read and follow the instructions mentioned in the literature.

Key words: Readability, awareness, farmers, plant protection chemicals (PPCs) and constraints.

INTRODUCTION

Use of plant protection chemicals is an important factor in increasing agricultural production. The success of rainbow revolution can be attributed to breakthrough in use of plant protection chemicals along with other production factors. Pesticides have been established as indispensable input in modern high-tech agriculture for attaining higher food production. But their indiscriminate and injudicious use have resulted into widespread pesticide contamination in food as well as various components of environment in the region. In an analysis of twenty samples of diet collected from in an around Kanpur, U.P. during July to October 1999, it was found 90 per cent sample were contaminated with pesticide residues. Magnitude of contamination was more in non-vegetarian (mutton, chicken, *etc.*) than vegetarian diet (chapatti, rice, dal, salad, *etc.*) HCH, Aldrin, Dialdrin were the main contaminants (Kumar 2009). Average daily intake of their residues were more than their acceptable daily intake (ADI) accounting for 1448.22, 35.52 and 36.86 μg/person/day, through non-vegetarian diet and 1501.44, 95.93 and 367.02 μg / person / day through vegetarian diet, respectively. Thus, it is clear from these discussions that farmers are not taking serious steps in pesticide application in majority of crops. After a long journey of pesticide development in respect of new low dose pesticide chemicals, formulation, application equipments, pesticide residues are still present in food materials even in mother's milk and it needs immediate development of good package of practices in various cropping systems with sound plant protection measures covering proper dose, application schedule and application methodology of pesticide.

Under such circumstances consumers are also becoming quality conscious. They are asking for agricultural produce free from residues of plant protection chemicals. To address such issues research institutions have developed technologies like integrated pests management (IPM) for various crops. The government and research and development institutions have come out with various strategies in which supplying literature along with every plant protection chemicals package has been made mandatory to the users and give instructions like how to use the chemical? what amount of dilution is essential ?, what are the precautions to be taken before and after the use of chemical? *etc.,* But the issue is whether the farmers are using this information? If yes, what is the extent of usage, if no, what are the reasons for the same,? was it readable? did readers understand it? So many such questions arise at this juncture. Against this backdrop, the present study was planned to address the issues of readability of the literature supplied with Plant Protection Chemicals. The study revolves round the question like: Is the farmers reading the instruction sheet which they get along with plant protection chemicals? Is that material readable? Is there any problem associated with its

[1] Assistant Professor (Sr. Scale), Deptt. of Ext.Edu.,Instt.of Agril. Sci. BHU, Varanasi-221005 [2] Senior Research Fellow, CATAT, Indian Agriculture Research Institute (IARI), New Delhi- 110012
[3] Agriculture Officer (Prob.). (Ex Student of Deptt. of Ext.Edu.,Instt.of Agril. Sci. BHU, Varanasi) Punjab- 148002 [4] Assist. Manager(Prob.),F-40, Super Branch, Connaught Circus, New Delhi- 110002

understanding and so on?

METHODOLOGY

The study was conducted in Varanasi district of U.P. in the year 2009. There are eight blocks in this district, Sevapuri block was purposively selected because of higher literacy percentage. In the block varieties of vegetables are grown and good numbers of plant protection chemicals (PPCs) being used to control the incidence of insect-pests and diseases by farmers. Four villages namely Maharajpur, Gaharpur, Jaddupur and Bhelupur were selected randomly for the study. Twenty eight farmers from each villages who use the plant protection chemical except Bhelupur (26 farmers) were selected using equal allocation sampling technique. Family member who was actually engaged in cultivation and using PPCs was taken as a unit of analysis for this study. Thus a total of 110 respondents constituted sample of the study. A structured interview schedule was prepared by searching relevant literature, consulting the expert related to Plant Protection and finally utilized for data collection. Mean, standard deviation, correlation and regression analyses were employed to derive meaningful conclusion.

Methods of measuring readability

Readability as the characteristic of the reading material that determines how difficult or easy to read and understand. They further indicated that, the effectiveness of printed materials depends on a variety of factors including (i) readability, (ii) comprehension and (iii) the amount and type of information presented. A readability formula is a method of estimating the probable success a reader will have in reading and understanding a piece of writing. It is a predictive device, which provides an estimate of the difficulty of writing without requiring the reader to read it and undergo tests of it (Klare, 1963). A total of fifteen statements were finalized with the help of experts from plant protection departments for quantifying the readability of literature supplied with plant protection chemicals. Each statement was assigned a score of '1' for 'yes' and '0' for 'no', and for the negative statements the scoring procedure was just reversed.

Thus the maximum obtainable score was '15' and minimum was '0', which gave Readability Index (RI) of one respondent. Mean and standard deviation were calculated as a measure of check to categorize readability into low, medium and high.

$$\text{Readability Index (RI)} = \frac{\text{Obtained score}}{\text{Maximum obtainable score}} \times 100$$

RESULTS AND DISCUSSION

Socio-personal profile of farmers

The data presented in Table 1 revealed that majority of the farmers (54.45%) were middle aged. All of them belonged to OBC category (100%), had medium level of education (61%) and lived in joint family (72.73%). Most of the farmers fall in marginal land holding category (59%), but they exhibited medium risk orientation (67.28%) towards agricultural crop production. Majority of the farmers showed medium level of social participation (75%). The report by Sawant *et al.* (1999) in their experimental study revealed similar results.

Table 1: Socio-personal profile of farmers

n=110

Antecedent variable		Frequency	Percentage	Mean	SD	Range
Age	Below 30	19	17.27			
	30- 60	61	54.45	45.25	15.62	17-86
	above 60	30	27.28			
Education	Low (< 2.78)	10	9			
	Medium (2.78 - 5.96)	67	61	3.87	1.09	2-6
	High(> 5.96)	33	30			
Caste category	ST	Nil	Nil			
	SC	Nil	Nil			
	OBC	110	100			
	GN	Nil	Nil			
Family Type	Nuclear	30	27.27			
	Joint	80	72.73			
Family Size	Small(<5)	33	30			
	Medium(5-10)	54	59			
	Large(10-15)	13	12			
	Very Large(>15)	10	9			
Land Holding	Marginal (<1 ha.)	65	59	1.48	0.50	1-2
	Small (1-2 ha.)	35	41			
Annual Income	25-50 Thousand	45	41			
	50- 200 Thousand	37	33.63	3.36	0.83	2-5
	200- 400 Thousand	28	25.63			
Material Possession	Low (< 2.53)	Nil	Nil			
	Medium (2.53 - 4.19)	91	100	3.36	0.83	2-5
	High(>4.19)	9	10			
Innovativeness	Low (< 15.56)	5	4.55			
	Medium (15.56-18.78)	77	70	3.22		10-23
	High(>18.78)	28	25.45			
Risk Orientation	Low (< 14.40)	18	16.36			
	Medium (14.40-16.61)	74	67.28	2.21		8-24
	High(>16.61)	18	16.36			
	Low (< 32.88)	16	14.55			
	Medium (32.88-39.31)	77	70	2.21		15-45
	High(>39.31)	17	15.45			
Social Participation	Low (< 2.48)	12	11			
	Medium (2.48-11.47)	83	75	8.99		5-20
	High(>11.47)	15	14			
Communication Behaviour						
I. Information Input	Low (< 20.72)	20	18.18			
	Medium (20.27-25.16)	20	18.18	22.94	2.21	18-28
	High(>25.16)	70	63.64			
II. Inf ormation Process	Low (< 29.36)	13	11.82			
	Medium (29.36-38.60)	84	76.37	9.24		10-30
	High(>38.60)	13	11.82			
III. Information out put	Low (< 19.22)	31	28.18			
	Medium (19.22-22.36)	64	58.19			
	High(>22.36)	15	13.63			

Use pattern of plant protection chemical by the respondents

Table 2: Distribution of farmers using Plant Protection chemicals in different season.

n=110

Kharif Season		
Category **Fungicide**	**Frequency**	**Percentage**
Cereson	65	59
Insecticides		
Carbofuron 3G	35	32
Malathion	72	65.45
Endosulfan(Thiodan)	38	34.54
Rogor (Dimethoate)	22	20
Rodenticide		
Celphos	78	70
Weedicide		
Simazime	42	38.18
Rabi Season		
Weedicide		
Isoproturon	92	84
Fungicide		
Diathane M.45	74	67
Vitavex	28	25
Capton	46	42
Mancozeb 75%wp	64	58
Rodenticide		
Celphos	84	76
Insecticides		
Endosulphon	92	83
Aldrin	56	50
Zaid Season		
Fungicide		
Dithane Z-78	74	67
Indofil M-45	84	76
Bavox	78	70
Bavistin	54	49
Insecticide		
Endosulfan(Thiodan)	46	42
Malathion	92	74
Rodenticide		
Celphos	56	50

Kharif season

The data presented in Table 2 revealed that in *Kharif* season Celphos was mostly used by the respondents (70%) to control the rodent attack in view of minimizing the post harvest losses followed by Malathion (65%) especially used in the rice and okra crop for the disease control; Cereson was used by 59 per cent of respondents followed by Simazine used by about 39 per cent of respondents. While Endosulfan was used by 34 per cent in the various crop of *Kharif* season for the insect control and only 20 per cent farmer used Dimethoate for control of insect in their fields.

Rabi season

In *Rabi* season, high amount of chemicals were used in comparison to other seasons. In *Rabi* season 84 per cent

farmers used isoproturon herbicide in wheat field to overcome the infestation of *Phalaris minor* followed by Celphos (76%). Capton which is generally being used as seed treatment was not popular among the farmers and ultimately its adoption level was very less. It indicates that most of the farmers were not well aware about benefit through seed treatment. They concentrated on preventive measure and have less attention to curative measures of crop protection.

Zaid season

In zaid season, Indofil M-45 were mostly used for the controlling fungal disease in cucurbits family followed by Malathion (74%) in early stage of crops.

Readability of literature supplied with plant protection chemicals

Rawat (1968 quoted by Kumar, 2009) listed the constituents of reading, which include: (1) quick and accurate recognition of the printed symbol, (2) adequate understanding of the authors meaning and (3) use of the attained understanding *i.e.,* to appreciate or evaluate or to apply what is being read. Readability is the degree to which the meaning of text is understandable, based on the complexity of sentences and the difficulty of vocabulary.

Table 3: Distribution of respondent according to readability of literature

n=110

Statement	Yes	Percent
Observed the literature supplied with plant protection chemicals.	110	100
Read the literature	41	37
Understood the things mentioned in the literature	9	8
(i) Font size is too small	110	100
(ii) Too many technical terms	110	100
(iii) Language too complex	84	78
(iv) No any illustration	110	100
(v) Complex technical term written in local language	110	100
Followed the method suggested in the reading material	Nil	Nil
Satisfied with the method suggested in the reading material	Nil	Nil
Finding difficulty in following the method suggested in the literature	110	100
Was the information accurate	Nil	Nil
Was the information brief	88	88
Was the information clear	Nil	Nil
Was the information useful	33	30

The data presented in Table 3 showed that all the respondents (100%) had seen the literatures supplied along with plant protection chemicals, but 37 per cent of the respondents had gone through the literature, while only 8 per cent could understand it. The similar results were also reported by Bormush (1966). The pivotal reasons reported by the respondents were the font size was small and more technical words usage which was not easy to understand for a lay man. There were no illustrations and complex words were given in local language which

was not understandable to all the respondents (100%). While 78 per cent respondents expressed that the use of language was very complex to understand the same. All the respondents reported that there were no illustrations. Hence, they could not follow the methods mentioned in the literature. All the respondents felt that the information was not accurate and not clear. The information was found to be useful for 30 per cent respondents and 88 per cent respondents felt that the information was brief.

Table 4: Distribution of respondent according to readability problem

n=110

Category	Frequency	Percent
Low	110	110
Medium	Nil	Nil
High	Nil	Nil

Mean 4.795SD 0.775 Min. 4 Max 7

The data presented in Table 4 shows clearly that all the respondents faced high readability problem regarding the literature. The results show that the readability of the literature was very low. It seems that the plant protection chemicals manufacturing companies complete their formality of supplying information, but it is not benefitting the masses. They are not considering the importance of literature supplied with PPCs.

Constraints faced in reading the literature supplied with Plant Protection Chemicals

Table 5: Distribution of respondents according to constraints faced in using the literature supplied with Plant Protection Chemicals

n=110

Statements	Yes	Percent	No	Percent
Could not read the folder because of closeness.	94	86	16	14
The language is too complex.	92	84	18	16
Too many technical words.	110	110	Nil	Nil
The font size in folder readable.	Nil	Nil	110	100
The paper quality is good.	Nil	Nil	110	100
The folder was attractive.	Nil	Nil	110	100
The method mentioned is too complex.	110	100	Nil	Nil
The method suggested in the literature is different from method that is being followed.	110	100	Nil	Nil
Satisfaction with the performance of the pesticide	26	23.63	84	76

The data presented in Table 5 revealed that the range of problems faced by the respondents while reading the literature supplied with PPCs. According to study 94 per cent respondents could not read the literature. Majority of the respondents (92%) felt that language was too complicated and difficult to understand. Only 18 per cent respondents were satisfied with the language of literature. The main complexity in the language was use of complex technical words felt by 100 per cent respondents. Cent per cent of the respondents felt that the paper quality was not good, no illustration available and methodology mentioned was difficult to understand and follow.

Table 6: Distribution of respondents according to constraint faced.

n=110

Statement	Frequency	Percent
Low < (5)	Nil	Nil
Medium (5-11)	Nil	Nil
High > (11)	110	100

Mean 11.7091SD. 0.708 Min. 10 Mix 12

The data presented in Table 6 clearly showed that all the respondents faced high level of constraints regarding the reading of the literature supplied with plant protection chemicals (PPCs).

Respondent's preference of font sizes

Table 7: Respondents' preference of font size

n=110

Font Size	Frequency	Percent
6	Nil	Nil
7	Nil	Nil
8	Nil	Nil
9	46	41
10	64	59
11	Nil	Nil
12	Nil	Nil
Total	100	100

The data presented in Table 7 showed that majority of the respondents (59%) indicated that 10 font size was appropriate for reading and occupy less space as compared to other font size and rest 41per cent respondents preferred 9 font size. They strongly felt that 6, 7, 8 font size was very small and not readable, while 11& 12 font size were little bit large which occupy more space in the literature. Since every respondents felt that the font size was too small to read, a paragraph written in Hindi in different font size (6-12) was administered to the respondents in which 59 per cent respondents preferred font size 10 and 41 per cent preferred font size 9. Hence, it can be concluded that font size 10 is preferable to farmers.

Factor affecting readability of literature supplied with PPCs.

Table 8: Relationship between the various antecedent factors with readability of literature supplied with the plant protection chemicals.

n=100

Independent Variables	'r' values
Age	.214*
Education	-.209*
Family size	.119
Land holding	-.062
Material possession	.076
Annual income	-.235*
Innovativeness	-.025
Extension contact	-.128
Social participation	.207*
Risk orientation	.025
Information input	-117
Information process	.011
Information output	.39*
Communication Behaviour	.042

* Significance at 5% level of significance (2 tailed), ** Significance at 1% level of significance (2 tailed)

A critical examination of the data presented in Table 8 revealed that the independent variables like age and social participation were positively and significantly related at 5 per cent level of significance to the readability of the literature supplied with PPCs. While two independent variables like education and annual income were negatively and significantly related at 5 per cent level of significance with the readability of the literature supplied with PPCs. It means that there is no association between readability of the literature supplied with PPCs with caste, family size, land holding, material possession, innovations, risk orientation, extension contact and communication behaviour. This means that only four variables namely age, social participation, education and annual income exert their influence significantly on the readability of the literature supplied with PPCs.

Table 9: Regression analysis of antecedent factors with readability of literatures.

n=110

Variables	'β' value	Std error	't' value
Age	0.005	0.292	0.003
Education	0.069	-0.148	0.131
Family size	0.179	0.186	0.059
Land holding	0.150	-0.006	0.955
Material possession	0.940	0.047	0.646
Annual income	0.098	-0.212	0.038
Innovativeness	0.044	0.004	0.965
Extension contact	0.024	-0.068	0.506
Social participation	0.017	0.219	0.027
Risk orientation	0.067	0.024	0.804
Information input	0.047	0.075	0.521
Information process	0.041	0.031	0.431
Information output	0.043	0.100	0.322
Communication Behaviour	0.018	-0.016	0.901

F value at 5% is 2.28, R^2 = 0.252, (Intercept constant) = 25.20

The data presented in Table 9 showed that there was a variation in the readability of the literature supplied with plant protection chemicals to the extent of 25.2 per cent. The respective value was found to be non-significant at 14 degree of freedom at 5 per cent level of significance. Thus, the result implies that all the 14 independent variables could not be accounted for a significant amount of variation in the reading behaviour of the respondent.

CONCLUSION

The ultimate purpose of any printed material is to convey ideas to the farmers so that they adopt the recommendation in their field practices. Government of India made it mandatory for the input supplier agencies to provide the literature with their product which provide comprehensive information about the product and how to use the particular product. Hence, mostly input supplier agencies provide the literature, but they are just fulfilling the formality only. Because the majority of the respondents are not able to read and understand the given literature, they reported several problems in the literature like small font size, poor quality of paper, complex technical words, lack of illustration etc. Due to above difficult problems farmers are not understanding and reading the literature. PPC manufacturing firms must incorporate the suggestions like font size should be 9 or 10 size, paper quality should be better, width stroke should be proper, quality of print should be better, language should be as easy to understand, technical word should give clear meaning and give illustration if needed so that farmers can use PPCs at right time, right way in appropriate quantity and in efficient manner.

REFERENCES

Bormush, J.R., 1966. "Readability; a New Approach" Reading *Research Quarterly*, 1: 1(B): 79-131

Klare, G.R., 1963. *The Measurement of Readability*. IOWA State University Press, Ames.

Kumar, A., 2009. A study on readability of literature supplied with Plant Protection Chemicals (PPCs), *M.Sc. thesis (unpublished)*, Deptt. of Extension Education, Instt.of Agril. Sciences BHU, Varanasi-221005

Natikar, K.V., 2001. Attitude and use of farm journals by the subscriber farmers and their profile A critical analysis, *Ph.D. Thesis (unpublished),* Uni.Agric.Sci, Dharwad. (India).

Sawant, G.K., Pawar H.S., and Shinde, S.B., 1989. An analytical study of reactions of readers of *Shri Sugi Periodical Maharashtra J. Extn. Edu.*, 8 : 73-77.