

# Use of Current Generation Pesticide in the Context of Pesticide Acts, Food Safety-Net and Climate Change Factors in Bangladesh

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**Abstract:** Studies were conducted as to explore the use of pest and pesticide based on food safety and environmental factors in Bangladesh. The major objectives were to identify the factors relating to pesticide and climate change parameter interactions, prioritize the food safety of and to assess the implementation intensity of ICM and INM in the context of the Pesticide ordinance and Act of Bangladesh (FAO.WHO 2004). The study areas included district based Upazila and Agro-ecological sub regions. The data were collected directly from Field Technical Officers through a pretested investigative questionnaire guide and supported by integrated group discussion. Average grand mean was 67%, which indicate that general awareness is very high which need further detail studies.

**Key words:** Bio pesticide, Food safety net, Climate change, integrated crop management (ICM).

## INTRODUCTION

As defined in the World Food Summit 1996, Food Security and Food Safety related food security exist when all people at all times, have physical and economical access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Use of pesticides on food cereal crops, fruits and vegetables are increasing commonly throughout the country. These are sprayed .in the crop field to control pests that damage the produce during production, transport and storage or transport. This means access to wide variety of affordable foods grown locally or imported from the other states or country for domestic consumers. The amount of pesticide that remains in or on food is called pesticide residue.

Food safety is the basic requirement for a food product. Consumers may not become ill from eating a food product. Food safety became last decades very important for both governments, producers of food products and consumers as well. According to this definition the Bangladesh National Food Policy, 2006 categorized food security as enhanced food availability, increased food access by the food insecure and adequate supply of safe and nutritious food Islam, and Hoque, 2013 and Ali, 2013).

Thus food safety is an inclusive aspect of food security. Most of the chemo-pesticide hazards have long term health problems for the users. Chemical products or contaminants can be of different nature e.g. residues of pesticides or other phyto-products applied during production of most crops. Foods are adulterated by using various harmful chemicals and toxic artificial colours on the one hand; and rotten perishables turning to be poisonous foods are stored sold and served to consumers in an unhygienic atmosphere on the other.

Capital City research results revealed that 34 to 96 per cent of sweetmeats, biscuits, breads, and ice creams were adulterated. Previously it was found that over the preceding decades, some 50 per cent of the food samples tested in IPH laboratory were adulterated due to unscientific use of pesticides. Despite different reasons for unsafely and adulterations of foodstuffs in Bangladesh, urgent researches are needed on the regulatory failures to combat the current food safety problems persisting in Bangladesh Sonia and Talukder 2006 and Rahman et al 2005).

In the context the present research was conducted with the following main objectives to identify the factors relating to pesticide and climate change parameter interactions, prioritize the food safety of and to assess the implementation intensity of ICM and INM in the context of the Pesticide ordinance and Act of Bangladesh. Food manufacturers, processors, restaurants fast food outlets and so forth are all involved in one way or another in this corrupt practice of adulteration.

## METHODS AND MATERIALS

The methodology for the present study used system approach, which involved sequential discussion with concerned to identify the pesticide administration parameters as well as toxicity on different crops.

The studies involve the use of: i. field survey through a structured questionnaire guideline, ii. formal and non-formal interviews through key informant interview (KII), iii. Collection of informative data, reviewing the available reports and physical field visit of the sampled area.

**Variables:** The variables were A. Respondent: MOA Agriculture graduates and diplomas, BARI-BRRI Scientists, NGOs. B. Sites: Upazilla AEZ sub-regions of Ganges Floodplain, Meghna Floodplain, Tista Meander Floodplain, Hills and Terraces. C. Pesticides: Synthetic, Spinosad, Organic and Bio-pesticides.

**Questionnaire Guidelines:** The research questions were: 1. Which pesticide is most safe for national bio-environment in Bangladesh i. Organo-Chlorine, ii. Organo-Phosphate iii. Spinosad iv. Carbamidev. Fungicides. 2. Which pesticide is most unsafe for national bio-environment in Bangladesh? i. Chlorpyriphos ii. Cypermathrin iii. Bio-extract iv. Lambda Cyhalothrin v. Organics. 3. What are food- safety points of plant protection materials? Duration of residual effects ii. Half life of the ingredient iii. External removal of the residue iv. Organic carbon bonds v. Metabolic rates. 4. What is the implementation status of the following method? i. IPM-<50% / >50 %. ii. ICM-<50% / >50%, iii. INM-<50% / >50 % iv. IPNS-<50% / >50 %, v. IPCM, <50% / > 50 %. 5. Pests and Pesticide related priorities finding open questions.

**RESULTS AND DISCUSSION**

The results obtained from the present studies on the use of Pesticide and Food Safety Environmental Factors in Bangladesh are mentioned here as per set objectives and outputs.

**Pesticide-Environment Interaction Factors**

The research found on the pesticide-climate change interaction factors are given in the Tables 1 to 4 and Figs. 1 to 8. The results show that the mean grand response on the technical points was only 67%. It indicates that practical knowledge about the characteristics were higher. As categorical respondent based findings it may be told that the respondent of the Bangladesh Agricultural Research Institute (BARI) and Bangladesh Rice Research Institute (BRRI) National Agricultural Research System (NARS) was highest being 71%, being lowest for Pesticide Companies and Non-Government Organizations (NGO) 63%. As safe product for the nation Spinosad scored highest as 81%. It may be stated that the spinosad is a biological pesticide having low toxicity level. Organo-chlorine products scored lowest as environmental safety was concerned.

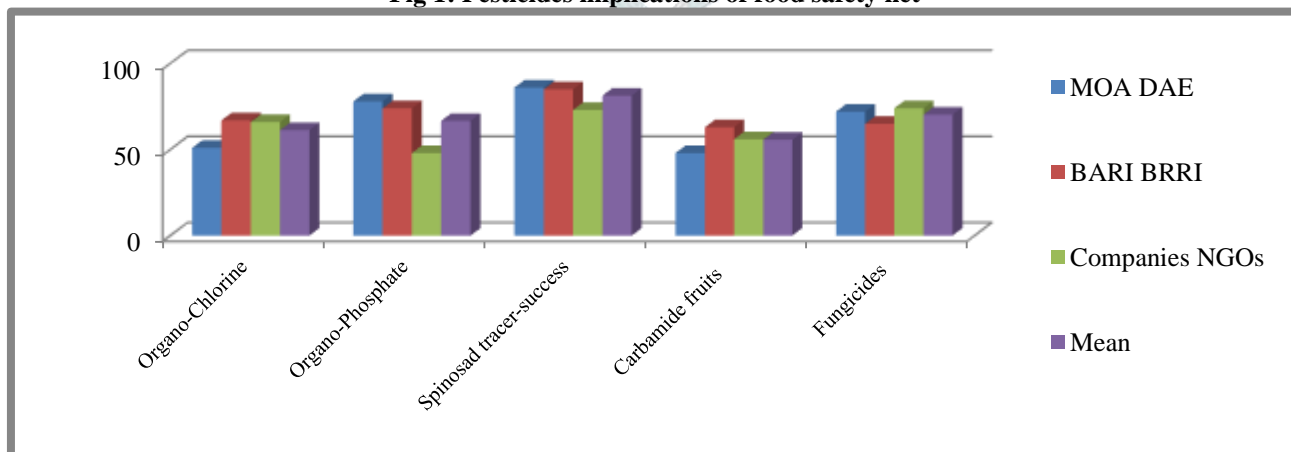
**Safe Pesticide Safety Net Factors:**

The results obtained on the safe pesticide for environment are given in the Table-1 and figure The results show that the mean grand response on the technical points was only 67%. It indicates that practical knowledge about the characteristics were higher. As categorical respondent based findings it may be told that the respondent of the Bangladesh Agricultural Research Institute (BARI) and Bangladesh Rice Research Institute (BRRI) National Agricultural Research System (NARS) was highest being 71%, being lowest for Pesticide Companies and Non-Government Organizations (NGO) 63%. As safe product for the nation Spinosad scored highest as 81%. It may be stated that the spinosad is a biological pesticide having low toxicity level. Organo-chlorine products scored lowest as environmental safety was concerned.

**Table 1: Level of safe current generation pesticides in Bangladesh**

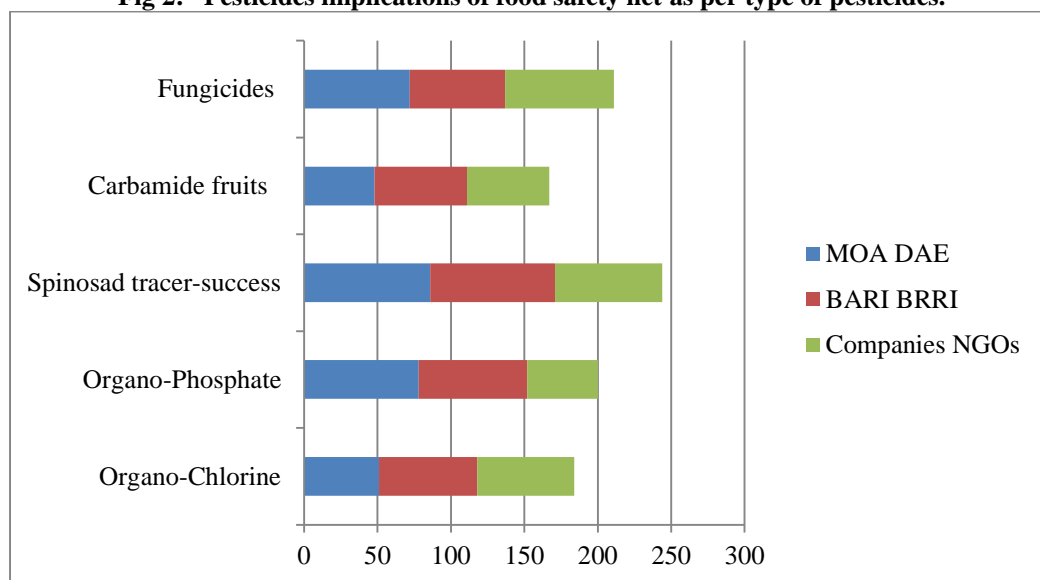
	Organo-Chlorine	Organo-Phosphate	Spinosad tracer-success	Carbamide fruits	Fungicides	Mean
MOA DAE	51	78	86	48	72	67
BARI BRRI	67	74	85	63	65	71
Companies NGOs	66	48	73	56	74	63
Mean	61	67	81	56	70	67

**Fig 1: Pesticides implications of food safety net**

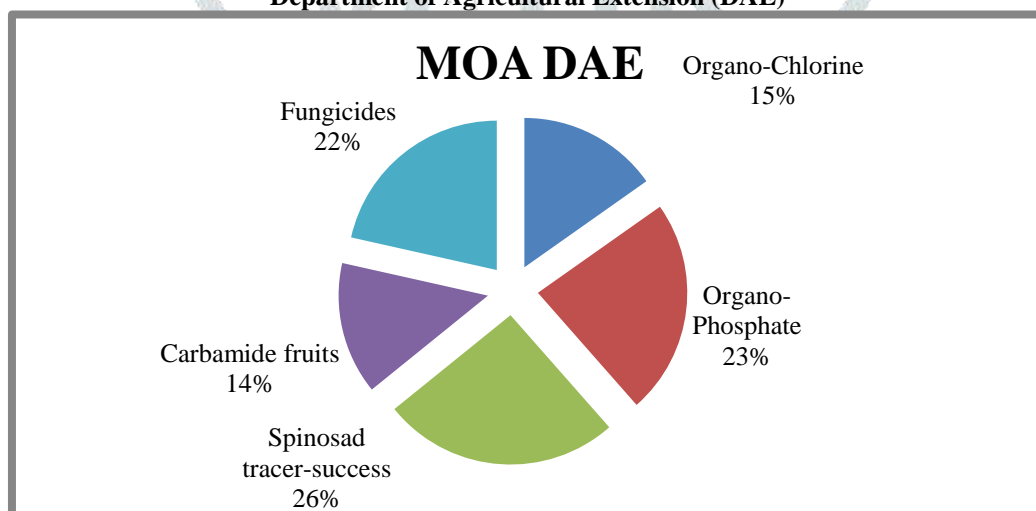


As an individual mean tracer-successs spinosad was recommended by Ministry of Agriculture and department of Agricultural Extension Khamarbari (MOA-DAE) up to 86% safe for the environment, while Organo-chlorine was stated 48%. Response was highest in case of BARI-BRRI-NARS by 71% and lowest by Company-NGO 63%. As mean results Spinosad was stated to be safe by 81%, while carbamide fruits was 56%.

**Fig 2: Pesticides implications of food safety net as per type of pesticides.**



**Fig 3: Percent Pesticides implications of food safety net as per type of pesticides for Ministry of Agriculture (MOA) and Department of Agricultural Extension (DAE)**



**Safe Food of Plant Protection Materials**

The result obtained on safe food safety-net parameters of plant protection materials are given in Table 2 and Figs-3-4. Results shows that 60% respondents, response in Meghna Floodplain was in favour of duration of residual effect of Pesticide and 16% response in Tista Meander Floodplain about half life.

**Table 2: Food- Safety Points of Plant Protection Materials**

	Duration of residual effects	Half life	Externally removable residue	Organic carbon bonds	Metabolic rates	Mean
Ganges	58	19	55	23	55	42
Meghna	59	38	61	63	78	60
Tista	54	16	53	54	51	46
Hills terrace	43	19	36	17	54	34
Mean	54	23	51	39	60	45

The grand mean is 45% which is below the minimum level.

**Fig 4: Percent Pesticides implications of food safety net as per type of pesticides for Ministry of Agriculture (MOA) and Department of Agricultural Extension (DAE)**

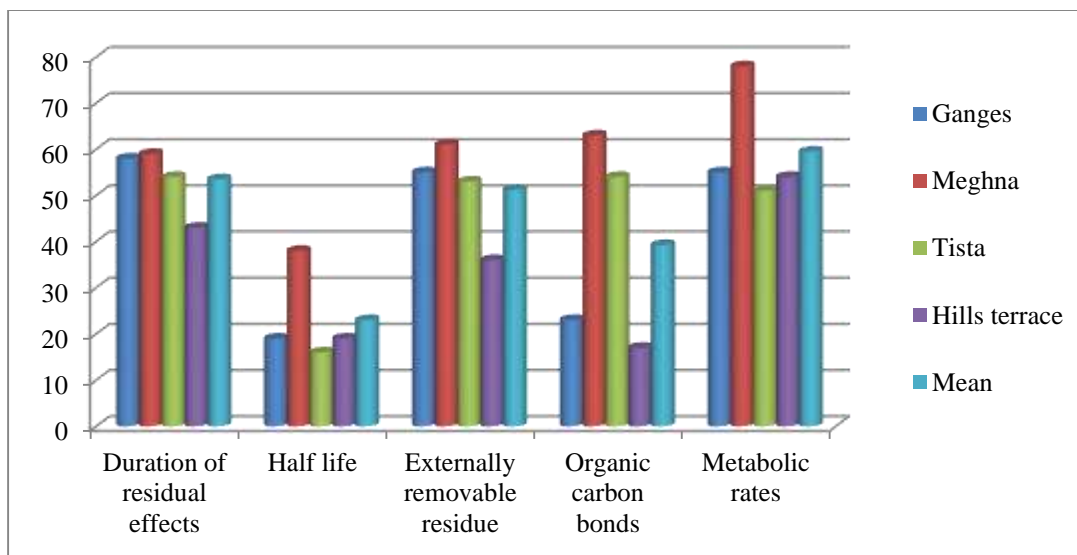
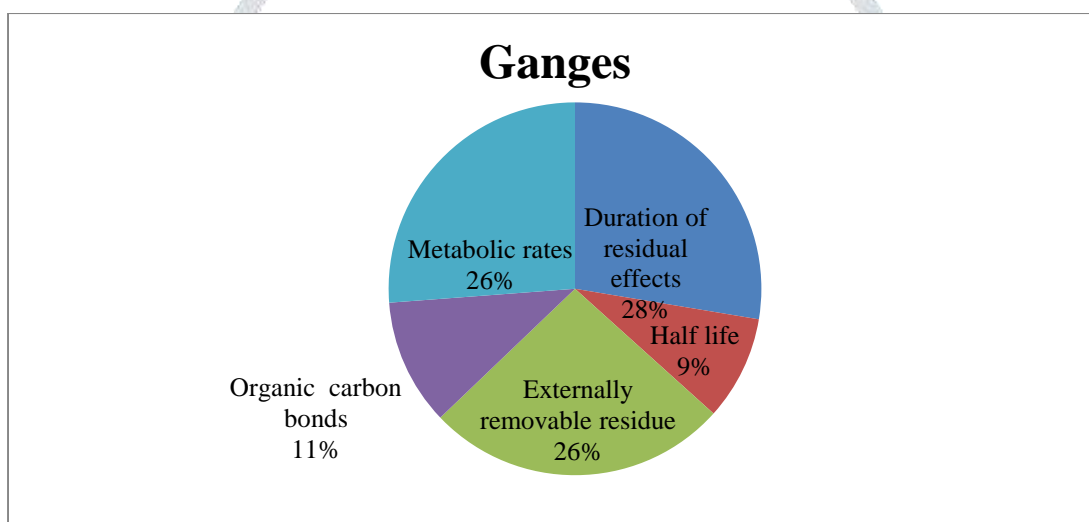


Fig 5: Percent Safe Food for Plant Protection Materials



**ICM and INM Status**

The result obtained in ICM and INM and nutrition system status implementation in the field is given in Table 3 and Figs 5-6. Result shows that 72% in the Ganges Floodplain were aware about ICM and 12% were aware about IPCM and INM. The grand mean is 24% which indicates that mass people are not aware about integrated systems like INM, IPNS, IPCM IPM and ICM. The IPM is very old program but there was no follow up of that program but no extension work was done on INM, IPCM and others.

Table 3: Implementation status of ICM and INM

	ICM	IPM	INM	IPNS	IPCM	Mean
Ganges	72	32	15	18	12	30
Mehgna	54	37	11	15	10	25
Tista	45	25	10	12	13	21
Hill terrace	29	39	9	18	10	21
Mean	50	33	11	16	11	24

The results of the Table 3 show that the mean integrated system implementation was found highest in Ganges as 30% as, highest, while INM and IPCM were lowest.

Fig 6: Line graph showing the implementation status of integrated crop, nutrition and pest management

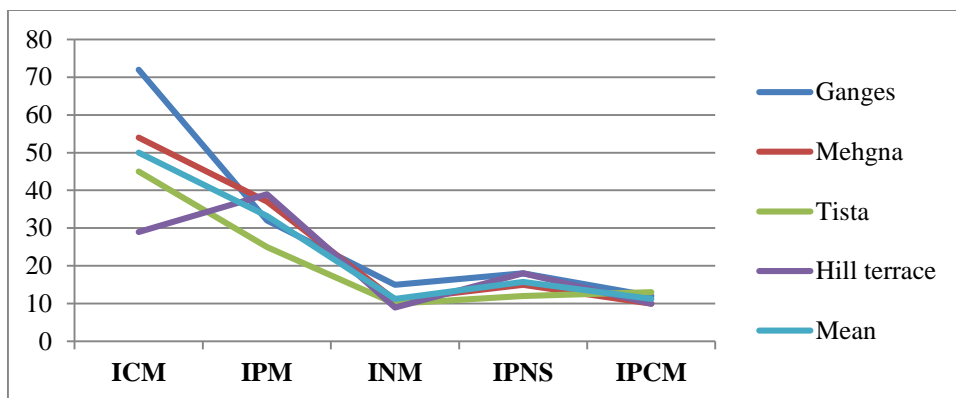
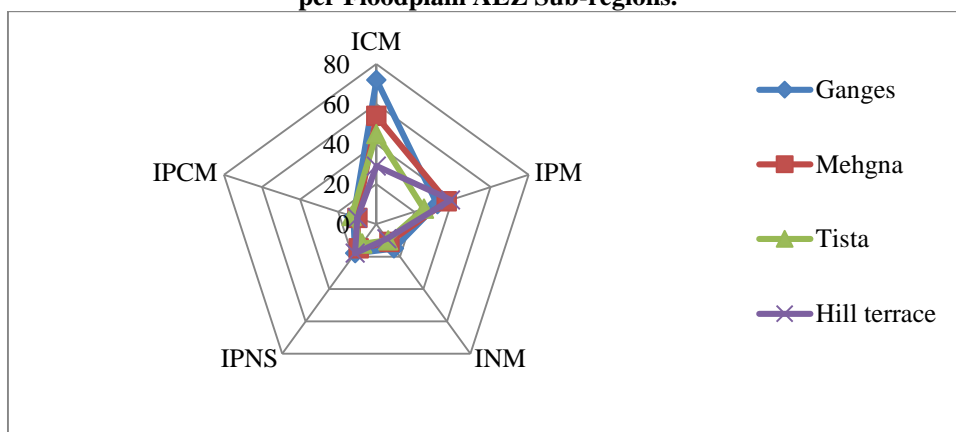


Fig 7: Dynamic matrix graph showing the implementation status of integrated crop, nutrition and pest management as per Floodplain AEZ Sub-regions.



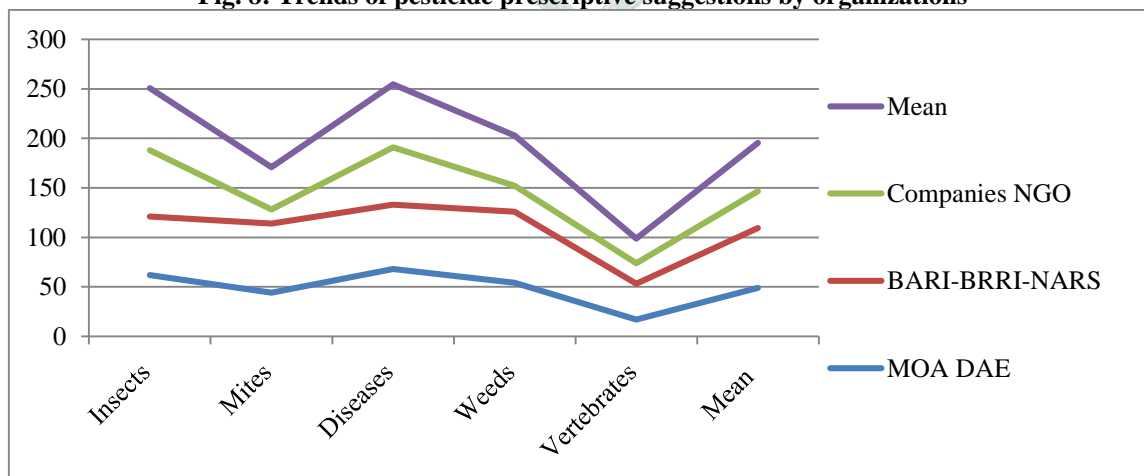
**Suggestions for Pesticide Application**

The result obtained in prescriptive suggestions of pesticide application is given in Table 4 and Figs 8- and 10. Result shows that BARI-BRRI gave 60 % prescription information in pesticide only for controlling insect and 37% by companies and NGOs. The grand mean is 49% which indicate that total awareness is at lower level.

**Table 4: Pesticide prescriptive suggestions**

	Insects	Mites	Diseases	Weeds	Vertebrates	Mean
MOA DAE	62	44	68	54	17	49
BARI-BRRI-NARS	59	70	65	72	36	60
Companies NGO	67	14	58	26	21	37
Mean	63	43	64	51	25	49

**Fig. 8: Trends of pesticide prescriptive suggestions by organizations**



**Fig. 9: Trends of pesticide prescriptive suggestions by pest categories**

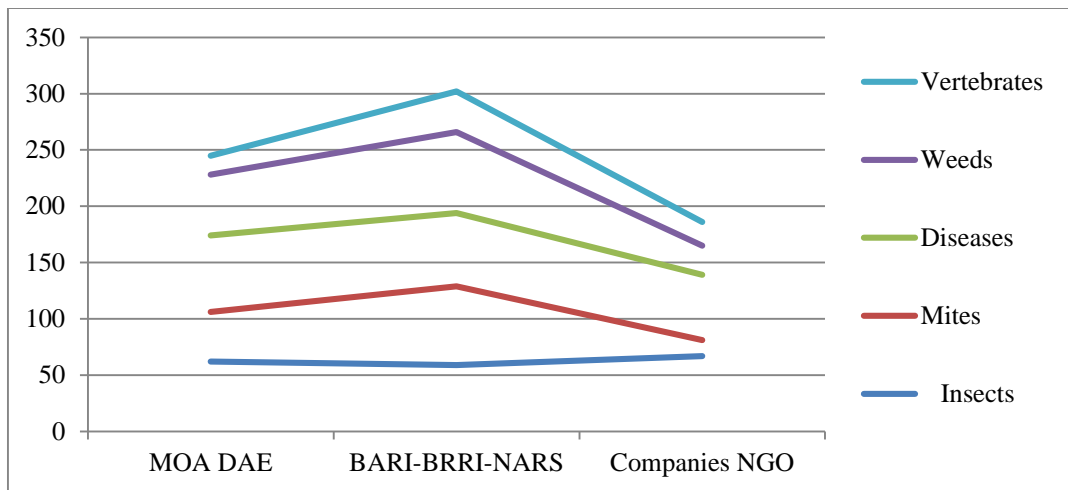
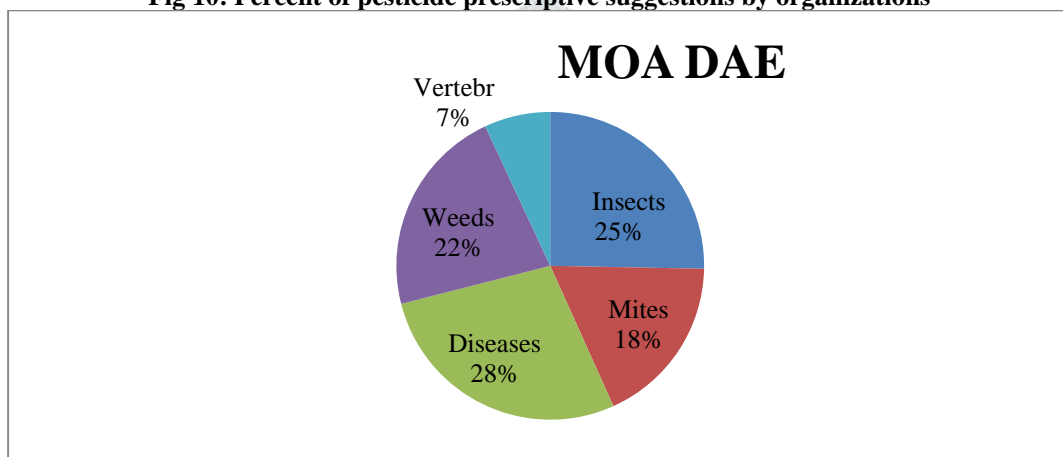


Fig 10: Percent of pesticide prescriptive suggestions by organizations



**SUMMARY AND RECOMMENDATIONS**

Pesticide safety net awareness was higher. The current explanations of ICM and INM should be followed up regularly to the users. Products like tracer and success group of Spinosad should be encouraged for environmental safety. Technical knowledge of Companies and NGOs is very less due to the scarcity of agricultural graduates. So they should illustrate the climate change implications of agricultural production more precisely. Research and Development work along with training should be done by the dominant Pesticide Companies in addition to government line agent research organizations.

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