State of Pesticide Regulations in India

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Executive Summary

The Indian Parliament sets up the Joint Parliamentary Committees (JPC) only on critical issues of public interest. Only five such committees have been formed in the history of independent India. The JPC formed on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juices and Other Beverages, in 2003, was the fourth and the only committee to have been set up on public health issue. The rest have been to investigate scams.

The JPC was set up after Centre for Science and Environment (CSE) released its study on pesticide residues in soft drinks. The committee was to review the veracity of the CSE study and to suggest the criteria for evolving standards on soft drinks, fruit juices and other beverages. CSE was vindicated and in the course of evolving standards on pesticide residues in soft drinks, fruit juices and beverages, the committee found loopholes in the pesticides regulations as well as their implementation.

In 2005, the JPC set out a clear agenda for governments to ensure the safe use of pesticides. The committee recommended to make mandatory the setting of maximum residue limits (MRL) for pesticides before registering it, setting MRLs for deemed registered pesticides, reviewing the set MRLs for compliance with the Acceptable Daily Intake (ADI) of pesticides and monitoring pesticide residues regularly.

The paper reviews the state of pesticide regulations in India from a food safety perspective in the light of the recommendations made by the JPC.

Pesticide use in India is regulated by the Central Insecticides Board and Registration Committee (CIBRC) and the Food Safety and Standards Authority of India (FSSAI). The CIBRC registers pesticides for crops while the FSSAI sets the maximum residue limits of pesticides for the crops it has been registered for.

It was found that recommendations of JPC have not been followed properly. Of the 234 pesticides registered in the country, the FSSAI has not set MRLs for 59 pesticides. A review of MRL status of 20 commonly used and recommended pesticides showed that the MRLs set for 18 pesticides are not complete. MRLs have not been set for all the crops these pesticides have been registered for. A few MRLs have been set for crops for which the corresponding pesticide is not registered. MRLs have been set for broad groups like fruits, vegetables and food grains rather than specific crops while the pesticides have been registered for specific crops.

In the paper, the Theoretical Maximum Daily Intakes (TMDI) for 20 pesticides was calculated to check the compliance of these pesticides with ADI. The TMDIs of seven pesticides was above the corresponding ADIs for adults while TMDIs for nine pesticides was higher than ADI for children. The comparison of TMDIs with reference doses (RfD), US EPA equivalent of ADI, showed that they were higher than corresponding RfDs for six and eight pesticides for adults and children respectively.

A review of 11 important crops in India were done—wheat, paddy, apple, mango, potato, cauliflower, black pepper, cardamom, tea, sugarcane and cotton. The paper shows that the pesticide recommendations made by state agriculture universities, agriculture departments and other boards for a crop do not adhere to the pesticides that the CIBRC has registered for those crops. The agriculture universities, departments and boards have recommended many pesticides that have not been registered for some crops.

Recommendations of waiting periods for pesticides are not complete. An analysis of 10 common pesticides showed that waiting periods for many of their registered uses (crop-pest/weed/disease combination) have not been recommended.

The farmers were found to be unaware of the registered uses of pesticides. They mostly followed the pesticides as the dealers recommended them.The outreach of state agriculture universities and departments to the farmers was minimal.

Abbreviations Used

ADI	Acceptable Daily Intake
CIBRC	Central Insecticides Board and Registration Committee
EU	European Union
FSSA	Food Safety and Standards Act
FSSAI	Food Safety and Standards Authority of India
GAP	Good Agricultural Practices
MRL	Maximum Residue Limit
NHB	National Horticultural Board
NIN	National Institute of Nutrition
NSSO	National Sample Survey Organization
RfD	Reference Dose
SAD	State Agriculture Department
SAU	State Agriculture University
TMDI	Theoretical Maximum Daily Intake

1. Introduction

The pesticides' regulations in India are governed by two different bodies: the Central Insecticides Board and Registration Committee (CIBRC) and the Food Safety and Standards Authority of India (FSSAI). CIBRC was established in 1968 under the Department of Agriculture and Co-operation of Ministry of Agriculture. It is responsible for advising central and state governments on technical issues related to manufacture, use and safety issues related to pesticides. Its responsibilities also include recommending uses of various types of the pesticides depending on their toxicity and suitability, determining the shelf life of pesticides and recommending a minimum gap between the pesticide applications and harvesting of the crops (waiting period)[1]. The other part of the CIBRC, the registration committee, is responsible for registering pesticides after verifying the claims of the manufacturer or importer related to the efficacy and safety of the pesticides[2]. It is the Food Safety and Standards Authority of India that is responsible for recommending tolerance limits of various pesticides in food commodities. The FSSAI was established under the Food Safety and Standards Act, 2006[3].

The State Agriculture Universities (SAUs), State Agriculture Departments (SADs) and other institutions related to specific crops like National Horticultural Board (NHB) and Spices Board of India make another set of recommendations for agricultural practices including use of pesticides. These recommendations are important considering the local needs of the states and research about specific crops, their diseases and insects. The SAUs and SADs have their own extension departments to reach out to the farmers. The farmers of India though have a conventional understanding of agriculture; they lack in the technical understanding of pesticides, their uses and safety aspects. This makes them vulnerable to misguidance and increases chances of unnecessary and inappropriate use of pesticides. The ever-increasing population of India also puts constant pressure on agriculture to improve productivity. The misuse of pesticides in such scenario is very likely.

The harmful effects of the pesticides are now established worldwide. The harm caused may be acute or chronic in nature. Farmers and agricultural labourers are the direct users of pesticides and are more likely to get affected by the acute toxicity of pesticides. The chronic toxicity affects the whole population. The residues left in the crops, soil and water after use get into the human food chain. Intake of pesticide residues through food and water has been linked to birth defects, toxicity to fetus, cancers, genetic defects, blood disorders, neurotoxicity and endocrine disruption.

In 2003, a Joint Parliamentary Committee (JPC) was formed after CSE released its report on pesticides in carbonated beverages of various brands. The JPC was formed with objectives of verifying the results that CSE had found and to suggest the criteria for evolving suitable safety standards for soft drinks, fruit juice and other beverages where water is the main constituent. The committee came up with various recommendations about the residue limits in beverages, fruits juices and drinking water as well as regulations of pesticides in India.

1.1 Recommendations of the Joint Parliamentary Committee

- There were several laws and many ministries at that time looking after the issue of food safety. The committee recommended formation of Food Safety and Standards Authority of India to make one single authority to deal with the issues of food safety.
- The committee recommended that standards for carbonated beverages best suited for the Indian conditions need to be fixed in the overall perspective of public health.
- The committee noted that daily intake of various foods had not been established which could be used to decide the intake rate of pesticides. The committee recommended a collaborative research with premier institutions in the country involved on the total exposure to pesticides.
- The committee also recommended proper monitoring of ground water to check the depletion in its level and its quality.
- The committee noted that fruit juices couldn't be clubbed with carbonated beverages. It recommended separate MRLs for these two products.
- The committee also recommended that institutions like Indian Council of Medical Research (ICMR), National Institute of Nutrition and Central Food Technological Research Institute (CFTRI) should evolve data-

base taking into account our food habits with regard to consumption of processed and non-processed food, level of contaminants, and pesticides in these food products, their conformity with acceptable daily intake, usage of pesticide in agriculture and public health programme based on their database.

- The committee desired that the data for the registered pesticides should be completed and accordingly MRLs for all the pesticides should be set.
- The committee recommended review of MRLs existing to check their compliance to the Acceptable Daily Intakes (ADI). The process should be repeated with any scientific development in the field. In case daily intakes exceed ADI for pesticides, the MRLs should be reset.
- The committee recommended completing data on all pesticides including deemed to be registered pesticides for their residues in the products they are applied to and accordingly set the waiting periods. The farmers were to be educated about waiting periods.
- The committee recommended the Ministry of Health and Family Welfare and Ministry of Agriculture to take action to check the uses of restricted pesticides like Lindane and DDT for agricultural purposes.
- The committee recommended strict punishment for people indulging in selling banned and restricted pesticides.
- The committee also recommended monitoring of pesticides in various products on a yearly basis.
- The committee also recommended aggressive awareness programmmes for farmers and promoting use of bio-pesticides. It suggested promoting research and development to explore biodiversity of India for more eco-friendly pesticides. Promoting organic farming was also recommended.

Eight years after the committee submitted its report, it is important to analyze the current pesticides' regulations in India from the perspective of food safety.

2. Pesticide Residues

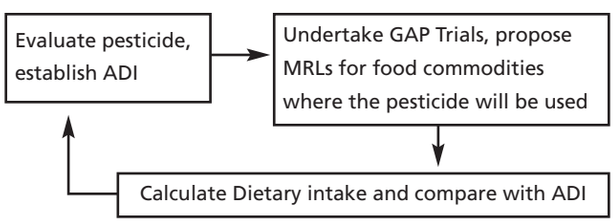
Pesticides are the chemical products used for plant protection. They include Insecticides, Fungicides, Herbicides and plant growth regulators. Residues of pesticides may remain in treated products and get into human food chain. These residues should not exceed a limit above which they may pose risks to human health. The concepts of Maximum Residue Limits (MRLs), Acceptable Daily Intake (ADI) and Theoretical Maximum Daily Intake (TMDI) for pesticides have been devised to keep a check on the pesticides' residues in food chain and keep them within safe limits.

Maximum Residue Limits (MRLs) are the maximum residues of pesticides, which may be expected in a product treated with them, considering that Good Agricultural Practices have been followed. ADI is the maximum intake of pesticide that can be tolerated from all dietary sources in a day without posing any chronic health risk. TMDI is an estimate of the maximum intake of the pesticide with the existing MRLs for a person following a particular dietary practice.

Good Agricultural Practices (GAP) have been defined as "practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products" by the Food and Agriculture Organization[4]. In India, the Bureau of Indian Standards (BIS) adopted the 'Requirements for Good Agricultural Practices' in 2010. It recommends practices for every stage of farming from land preparation to post harvest supply chain[5].

MRLs are not the maximum toxicological limits. However, care is taken to ensure that maximum levels do not give rise to toxicological concerns. The determination of MRL is, thus, a multi-step process. First, the residue levels are set by supervised field trials for various crops a pesticide has been registered for. Then, TMDI is calculated by estimating the total intake of pesticide from all possible sources taking into account the MRLs that have been set. ADI is determined from the available toxicological data and usually involves finding the maximum dose that would produce no adverse effects in a lifetime. If the TMDI exceeds the ADI, for a particular set of MRLs then the conditions prescribed under Good Agricultural Practices are modified to lower them (Fig 1.1). If that is not possible, the pesticide is declared unsuitable for the crop and any amount of it cannot be tolerated in the crop. It is also important that the MRLs set take care of the all age groups and both the sexes[6].

Figure 1.1 **Establishing MRLs for a pesticide. Globally, MRLs are reviewed periodically to incorporate changes in dietary pattern and in agricultural practices**



2.1 Status of Maximum Residue Limits in India

The Central Insecticides Board and Registration Committee (CIBRC) registers pesticides in India and recommends them for various crops. Food Safety and Standard Authority of India (FSSAI) is responsible for setting MRLs for the pesticides that have been registered by CIBRC. The MRLs for all registered pesticides should be set for all the crops they have been registered for. The exceptions for which MRLs are not required include Neem based products, biopesticides and few chemical pesticides like Sulphur.

A total of 234 pesticides have been registered by CIBRC (including Endosulfan* the use of which was banned in India in May 2011). The MRLs of 40 pesticides are not required while the MRLs of 59 pesticides have not been fixed by FSSAI (Table 2.1, Annexure 1a and 1b).

2.2 MRL Status of Common Pesticides

The 20 pesticides that have been considered are some of the most used and widely recommended pesticides in India (Table 2.2)

Table 2.1. List of Registered Pesticides for which MRLs have not been set

1.	Aluminium Phosphide	31.	Kasugamycin
2.	Aureofungin	32.	Kresoxim Methyl
3.	Azoxystrobin	33.	Mandipropamid
4.	Bensulfuron Methyl	34.	Mesosulfuron Methyl + Iodosulfuron Methyl Sodium
5.	Bispyribac Sodium	35.	Metaflumizone
6.	Bromadiolone	36.	Metalaxyl-M
7.	Carfentazone Ethyl	37.	Methyl Bromide
8.	Chlorantraniliprole	38.	Orthosulfamuron
9.	Chlorpropham	39.	Paclobutrazol
10.	Cinmethylene	40.	Pencycuron
11.	Copper Hydroxide	41.	Pinoxaden
12.	Copper Sulphate	42.	Propanil
13.	Cuprous Oxide	43.	Propaquizafop
14.	Difenthiuron	44.	Pyrachlostrobin
15.	Dinocap	45.	Pyridalyl
16.	Emamectin Benzoate	46.	Pyriproxyfen
17.	Ethiprole	47.	Pyrithiobac sodium
18.	Famoxadone	48.	Quizalofop-P-tefuryl
19.	Fenamidone	49.	Sirmate
20.	Fenpyroximate	50.	Sodium Cyanide
21.	Fipronil	51.	Spiromesifen
22.	Fluazifop-p-butyl	52.	Streptomycin + Tetracycline
23.	Flufenoxuron	53.	Thifluzamide
24.	Flufenzine	54.	Thiobencarb (Benthiocarb)
25.	Flusilazole	55.	Thiomethoxain
26.	Forchlorfenuron	56.	Triacontanol
27.	Hexazinone	57.	Trifloxistrobin
28.	Hexythiazox	58.	Validamycin
29.	Imazamox	59.	Zinc Phosphide
30.	Iprovalicarb		

Table 2.2. Commonly used and recommended pesticides in India

S. No.	Name of Pesticide	Consumption (MT, 2009-10)
1.	Phorate	3284
2.	Mancozeb	3118
3.	Methyl Parathion	2739.32
4.	Cypermethrin	2473
5.	Carbendazim	1992
6.	Monocrotophos	1815
7.	Malathion	1739.39
8.	Quinalphos	1595
9.	Acephate	1513
10.	Triazophos	1164.48
11.	Dichlorvos	960
12.	Fenvalerate	776
13.	2,4 – D	662
14.	Dimethoate	636
15.	Captan	471
16.	Zineb	462
17.	Paraquat dichloride	NA
18.	Chlorpyrifos	NA
19.	Phosalone	NA
20.	Carbofuran	NA

Source: Ministry of Agriculture (Consumption)

2.2.1 Phorate

Phorate was registered for 23 crops by CIBRC. The FSSAI has set MRLs for all the crops it was registered for (Table 2.3).

Table 2.3 MRL Status of Phorate

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
23 (Bajra, Barley, Maize, Paddy, Sorghum, Wheat, Black gram, Green gram, Pigeaon pea, Soybean, Sugarcane, Cotton, Groundnut, Mustard, Sesamum, Brinjal, Cauliflower, Chilies, Potato, Tomato, Apple, Banana and Citrus fruits)	23 (Bajra, Barley, Maize, Paddy, Sorghum, Wheat, Black gram, Green gram, Pigeaon pea, Soybean, Sugarcane, Cotton, Groundnut, Mustard, Sesamum, Brinjal, Cauliflower, Chilies, Potato, Tomato, Apple, Banana and Citrus fruits)	None	

2.2.2 Mancozeb

Mancozeb was registered for 23 crops by CIBRC. The FSSAI did not set MRLs for nine crops (Table 2.4).

Table 2.4 MRL Status of Mancozeb

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs setr
23 (Potato, Tomato, Wheat, Maize, Paddy, Jowar, Chilies, Onions, Tapioca, Ginger, Sugarbeat, Cauliflower, Groundnut, Grapes, Guava, Banana, Apple, Cumin, Tobaco, Mustard, Balck pepper, Pearl millet and Cucumber)	14 (Potato, Tomato, Wheat, maize, Paddy, Jowar, Chilies, Tapioca, Groundnut, Grapes, Guava, Banana, Apple, Pearl millet)	9 (Onions, Ginger, Sugarbeat, Cauliflower, Cumin, Tobacco, Mustard, Black pepper and Cucumber)	

2.2.3 Methyl Parathion

Methyl parathion was registered for seven crops by CIBRC. The FSSAI did not set MRLs for none of these crops. However, they have set MRLs for fruits and vegitables for which it has not been registered (Table 2.5).

Table 2.5 MRL Status of Methyl Parathion

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
7 (Paddy, Cotton, Black gram, Green gram, Soybean, Mustard, Groundnut)	None	7 (Paddy, Cotton, Black gram, Green gram, Soybean, Mustard, Groundnut)	2 (Fruits, Vegetables)

2.2.4 Cypermethrin

Cypermethrin was registered for eight crops by CIBRC. The FSSAI did not set MRLs for two crops (Table 2.6).

Table 2.6 MRL Status of Cypermethrin

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
8 (Brinjal, Cotton, Cabbage Okra, Sugarcane, Wheat Sunflower, Rice)	6 (Brinjal, Cotton, Cabbage Okra, Wheat Sunflower)	2 (Sugarcane, Rice)	

2.2.5 Carbendazim

Carbendazim was registered for 18 crops by CIBRC. The FSSAI did not set MRLs for four crops (Table 2.7).

Table 2.7 MRL Status of Carbendazim

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
18 (Paddy, Wheat, Barley, Tapioca, Cotton, Jute, Groundnut, Sugarbeet, Peas cluster, Beans, Cucurbits, Brinjal, Apples, Grapes, Walnut, Rose, Ber Mango)	14 (Paddy, Wheat, Barley, Cotton, Groundnut, Sugarbeet, Peas cluster, Beans, Cucurbits, Brinjal, Apples, Grapes, Ber Mango)	4 (Tapioca, Jute, Walnut, Rose)	2 (Banana, Groundnut)

2.2.6 Monocrotophos

Monocrotophos was registered for 14 crops by CIBRC. The FSSAI did not set MRLs for four crops (Table 2.8).

Table 2.8 MRL Status of Monocrotophos

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
14 (Paddy, Maize, Bengal gram, Green gram, Pea, Red gram, Sugarcane, Cotton, Castor, Mustard, Citrus fruits, Mango, Coffee, Cardamom)	11 (Paddy, Maize, Bengal gram, Green gram, Pea, Red gram, Cotton, Citrus fruits, Mango, Coffee, Cardamom)	4 (Sugarcane, Castor, Mustard, Cardamom)	6 (Carrot, Turnip, Potato, Sugarbeet, Onion, Chilies)

2.2.7 Malathion

Malathion was registered for 16 crops by CIBRC. The FSSAI did not set MRLs for five crops (Table 2.9).

Table 2.9 MRL Status of Malathion

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
16 (Paddy, Sorghum, Soybean, Cotton, Castor, Groundnut, Mustard, Sunflower, Okra, Cauliflower, Radish, Turnip, Tomato, Apple, Grape, Mango)	11 (Paddy, Sorghum, Groundnut, Mustard, Okra, Cauliflower, Radish, Turnip, Tomato, Apple, Grape, Mango)	5 (Soybean, Castor, Cotton, Mustard, Sunflower)	

2.2.8 Quinalphos

Quinalphos was registered for 32 crops by CIBRC. The FSSAI did not set MRLs for 28 crops (Table 2.10).

Table 2.10 MRL Status of Quinalphos

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
32 (Chilies, Paddy, Sugarcane, Sorghum, Okra, Cotton, Brinjal, Tomato, Tea, Tur, Groundnut, Wheat, Bengal gram, Black gram, Red gram, French bean, Soybean, Jute, Mustard, Sesamum, Cabbage, Cauliflower, Onion, Apple, Banana, Citrus fruits, Mango, Pomegranate, Cardamom, Coffee, Gram, Safflower)	4 (Chilies, Rice, Tea, Cardamom)	28 (Sugarcane, Sorghum, Okra, Cotton, Brinjal, Tomato, Tur, Groundnut, Wheat, Bengal gram, Black gram, Red gram, French bean, Soybean, Jute, Mustard, Sesamum, Cabbage, Cauliflower, Onion, Apple, Banana, Citrus fruits, Mango, Pomegranate, Coffee, Gram, Safflower)	2 (Pigeon pea, Chilies)

2.2.9 Acephate

Acephate was registered for three crops by CIBRC. The FSSAI did not set MRLs for one crop (Table 2.11)..

Table 2.11 MRL Status of Acephate

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
3 (Cotton, Safflower, Rice)	2 (Cotton, Safflower)	1 (Rice)	

2.2.10 Triazophos

Triazophos was registered for four crops by CIBRC. The FSSAI did not set MRLs for one crop (Table 2.12).

Table 2.12 MRL Status of Triazophos

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
4 (Cotton, Rice, Soybean, Brinjal)	3 (Cotton, Rice, Soybean)	1 (Brinjal)	1 (Chilies)

2.2.11 Fenvalerate

Fenvalerate was registered for four crops by CIBRC. The FSSAI has set MRLs for all the crops it was registered for (Table 2.13).

Table 2.13 MRL Status of Fenvalerate

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
4 (Cotton, Cauliflower, Brinjal, Okra)	4 (Cotton, Cauliflower, Brinjal, Okra)	None	

2.2.12 2,4 – D

2, 4 - D was registered for eight crops by CIBRC. The FSSAI did not set MRLs for one crop (Table 2.14).

Table 2.14 MRL Status of 2,4 – D

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
8 (Paddy, Maize, Wheat, Sorghum, Potato, Sugarcane, Citrus fruits, Grapes)	7 (Paddy, Maize, Wheat, Sorghum, Potato, Citrus fruits, Grapes)	1 (Sugarcane)	

2.2.13 Captan

Captan was registered for 14 crops by CIBRC. The FSSAI did not set MRLs for three crops (Table 2.15).

Table 2.15 MRL Status of Captan

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
14 (Chilies, Potato, Apple, Cherry, Grapes, Cabbage, Cauliflower, Brinjal, Beans, Tomato, Citrus fruits, Rose, Paddy, Tobacco)	11 (Chilies, Potato, Apple, Cherry, Grapes, Cabbage, Cauliflower, Brinjal, Beans, Tomato, Citrus fruits)	3 (Rose, Paddy, Tobacco)	

2.2.14 Zineb

Zineb was registered for 18 crops by CIBRC. The FSSAI did not set MRLs for five crops (Table 2.16).

Table 2.16 MRL Status of Zineb

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
18 (Jowar, Paddy, Wheat, Ragi, Tobacco, Onion, Potato, Tomato, Chilies, Brinjal, Cucurbits, Cauliflower, Cumin, Apple, Citrus fruits, Cherries, Grapes, Guava)	13 (Jowar, Paddy, Wheat, Ragi, Potato, Tomato, Chilies, Cucurbits, Apple, Citrus fruits, Cherries, Grapes, Guava)	5 (Tobacco, Onion, Brinjal, Cauliflower, Cumin)	

2.2.15 Paraquat Dichloride

Paraquat Dichloride was registered for 10 crops by CIBRC. The FSSAI did not set MRLs for three crops (Table 2.17).

Table 2.17 MRL Status of Paraquat Dichloride

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
10 (Tea, Cotton, Potato, Rubber, Rice, Wheat, Maize, Grapes, Apple, Aquatic weeds)	7 (Potato, Cotton, Rice, Wheat, Maize, Grapes, Apple)	3 (Tea, Rubber, Aquatic weeds)	

2.2.16 Dichlorvos

Dichlorvos was registered for 10 crops by CIBRC. The FSSAI did not set MRLs for seven crops (Table 2.18).

Table 2.18 MRL Status of Dichlorvos

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
10 (Paddy, Wheat, Soybean, Sugarcane, Castor, Groundnut, Mustard, Sunflower, Cucurbits, Cashew)	3 (Paddy, Wheat, Cucurbits)	7 (Soybean, Sugarcane, Castor, Groundnut, Mustard, Sunflower, Cashew)	1 (Fruits)

2.2.17 Dimethoate

Dimethoate was registered for 24 crops by CIBRC. The FSSAI did not set MRLs for 10 crops (Table 2.19).

Table 2.19 MRL Status of Dimethoate

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
24 (Bajra, Maize, Sorghum, Red gram, Cotton, Castor, Groundnut, Mustard, Safflower, Bhindi, Brinjal, Cabbage, Cauliflower, Chilies, Onion, Potato, Tomato, Apple, Apricot, Banana, Citrus fruits, Fig, Mango, Rose)	14 (Bhindi, Brinjal, Cabbage, Cauliflower, Chilies, Onion, Potato, Tomato, Apple, Apricot, Banana, Citrus fruits, Fig, Mango)	10 (Bajra, Maize, Sorghum, Red gram, Cotton, Castor, Groundnut, Mustard, Safflower, Rose)	

2.2.18 Chlorpyrifos

Chlorpyrifos was registered for 13 crops by CIBRC. The FSSAI did not set MRLs for three crops (Table 2.20).

Table 2.20 MRL Status of Chlorpyrifos

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
13 (Rice, Beans, Gram, Sugarcane, Cotton, Groundnut, Mustard, Brinjal, Cabbage, Onion, Apple, Ber, Citrus fruits)	10 (Rice, Beans, Gram, Cotton, Brinjal, Cabbage, Onion, Apple, Ber, Citrus fruits)	3 (Sugarcane, Groundnut, Mustard)	2 (Potato, Cauliflower)

2.2.19 Phosalone

Phosalone was registered for 13 crops by CIBRC. The FSSAI did not set MRLs for eight crops (Table 2.21).

Table 2.21 MRL Status of Phosalone

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
13 (Barley, Paddy, Sorghum, Cotton, Jute, Groundnut, Bhindi, Brinjal, Cabbage, Chilies, Tomato, Tea, Mustard)	5 (Bhindi, Brinjal, Cabbage, Chilies and Tomato)	8 (Barley, Paddy, Sorghum, Cotton, Jute, Groundnut, Tea, Mustard)	6 (Pears, Citrus fruits, Other fruits, Potato, Rapeseed oil, Mustard oil)

2.2.20 Carbofuran

Carbofuran was registered for 27 crops by CIBRC. The FSSAI did not set MRLs for five crops (Table 2.22).

Table 2.22 MRL Status of Carbofuran

Crops registered for	Crops for which MRLs are set	Crops for which MRLs not set	Crops not registered for but MRLs set
27 (Barley, Bajra, Sorghum, Jute, Groundnut, Frenchbean, Potato, Tomato, Apple, Citrus fruits, Maize, Paddy, Mustard, Soybean, Sugarcane, Bhindi, Chilies, Cabbage, Wheat, Brinjal, Banana, Peach, Mandarins, Cotton, Pea, Tea, Sweet pepper)	22 (Barley, Bajra, Sorghum, Groundnut, Frenchbean, Potato, Tomato, Apple, Citrus fruits, Maize, Paddy, Mustard, Soybean, Sugarcane, Bhindi, Chilies, Cabbage, Wheat, Brinjal, Banana, Peach, Mandarins, Pea)	5 (Jute, Sugarcane, Cotton, Tea and Sweet pepper)	

2.3 Analysis

The MRLs set under the Food Safety and Standards Act (FSSA), 2006 were found to be very incomplete in nature. They did not cover the range of crops for which the pesticides had been registered. Out of the 20 pesticides considered for analysis, the MRLs for Phorate and Fenvalerate covered all the crops they were registered for. MRLs for Methyl Parathion were set only for fruits and vegitables for which the pesticide was not registered. Of the 32 crops no MRLs were set for Quinalphos in 28 crops. Similarly for Dimethoate, no MRLs were set for 10 crops out of 24 crops (Table 2.23).

The MRLs prescribed by Codex and European Union (EU) were more elaborate and they provided MRLs for specific products. The EU MRLs have been recommended for all possible food commodities for all pesticides. The MRLs for a pesticide in products it is not expected to be found in have been set to the minimum detection limit.

The MRLs prescribed in the Food Safety and Standards Act, 2006 are mostly for broad product groups like vegetables, fruits and food grains. This approach is questionable on two counts. One, the MRLs are set following the Good Agricultural Practices and reviewed by calculating TMDI. The Good Agricultural Practices for different crops in a group like fruits may vary widely considering that different fruits are grown in different agroclimatic conditions with different set of practices. For example, in India apple is grown in hills and mango in plains. Therefore, it does not seem proper for all fruits to have the same MRLs.

Secondly, the calculation of TMDI includes average dietary practices. The consumption of different fruits varies widely in different areas especially in a country like India. Hence, it will also make the TMDI predictions more difficult. In this case, it does not seem proper to have common MRLs for groups like fruits, vegetables and food grains.

Status of JPC Recommendations

The Joint Parliamentary Committee had recommended to set MRLs for all pesticides including the deemed registered pesticides. It is evident that the recommendations have not been followed properly. The MRLs of 59 pesticides have not been set and the MRLs which have set do not cover all the crop that a pesticide has been registered for by CIBRC.

Table 2.23. MRL Status of Common Pesticides

Pesticides	Crops Registered	MRLs set	MRLs not set	MRLs set but not recommended
Phorate	23	23	0	0
Mancozeb	23	14	9	0
Methyl Parathion	7	0	7	2
Cypermethrin	8	6	2	0
Carbendazim	18	14	4	2
Monocrotophos	14	11	3	6
Malathion	16	11	5	0
Quinalphos	32	4	28	2
Acephate	3	2	1	0
Triazophos	4	3	1	1
Fenvalerate	4	4	0	0
2, 4 – D	8	7	1	0
Captan	14	11	3	0
Zineb	18	13	5	0
Paraquat dichloride	10	7	3	0
Dichlorvos	10	3	7	1
Dimethoate	24	14	10	0
Chlorpyrifos	13	10	3	2
Phosalone	13	5	8	6
Carbofuran	27	22	5	0

3. Safety Standards

MRLs are set according to the Good Agricultural Practices. They are not the limits of food safety. However, after MRLs are set, they are checked for their compliance to the safe limits of intake of pesticides.

3.1 Theoretical Maximum Daily Intake (TMDI)

TMDI is the estimate of the maximum intake of a pesticide from all sources for a person following a particular diet. It can be calculated from the MRLs of a pesticide in different food products and the average daily intake of the same products. For a fair comparison with ADI, which is determined considering a lifetime impact of pesticide intake at the maximum level of a pesticide, the TMDI should take into account the long term eating habits of people and not the day to day changes.

In the present calculations, the Dietary Guidelines for Indians by National Institute of Nutrition (NIN) has been considered for average daily intake of food commodities. The guideline recommends amounts of cereals, pulses, fruits, vegetables, fats/oils, sugar and milk that should be consumed by different age group of Indians[7]. Among these subgroups, amounts of commodities have been predicted from the average consumption habits of people estimated by the NSSO survey on household consumption of goods and services, released in 2012.[8] In the caculations, it has been assumed that the amounts of commodities in a particular subgroup will have the same distribution as in the NSSO data. For example, among fruits, the percentage contribution of a particular fruit to the total amount of fruits consumed per day will remain same in the menu as it is in the NSSO data (Table 3.1). The MRLs prescribed by the FSSAI in the Food Safety and Standards Regulations, 2011 were considered for the calculation[9]. (Table 3.2)

The TMDI was calculated by the standard formula used in the 1997 WHO recommendations for predicting the dietary intake of pesticides residues.

$TMDI = MRLi \times Fi$

Where, *MRLi* = Maximum Residue Limit for a given food commodity

Fi = Per capita Food regional consumption of that food commodity[10]

For the caculations, it has been assumed that the density of milk is 1.03 kg/L and the fat content in it is 3 %. The MRLs for oilseeds have been considered to be the MRLs of edible oils where the later was not set.

The TMDIs were calculated for 20 very commonly recommended pesticides in India for a 1-3 years old child (12.9 kg) and an adult weighing 60 kg. ADIs have not been determined in India. Therefore, ADIs prescribed by Codex and the Reference Doses (RfD) prescribed by the US EPA were considered for comparison with the calculated TMDIs.

The pesticides considered included Phorate, Mancozeb, Methyl parathion, Cypermethrin, Carbendazim, Monocrotophos¸ Malathion, Quinalphos, Acephate, Triazophos, Fenvalerate, 2,4 – D, Captan, Zineb, Paraquate dichloride, Dichlorvos, Dimethoate, Chlorpyrifos, Phosalone and Carbofuran. Among these pesticides ADIs of all except Quinalphos had been

Table 3.1. Diets considered for calculating TMDI

Food commodities	For adult (60 kg) Quantity (g/day)	For 1-3 year old child (12.9 kg) Quantity (g/day)
Cereals and millets	**375**	**60**
Rice	173	28
Wheat	139	22
Others	63	10
Pulses	**75**	**30**
Milk and milk products	**309**	**515**
Roots and tubers	**200**	**50**
Potato	116	29
Onion	62	15.5
Others	22	5.5
Green leafy vegetables	**100**	**50**
Cabbage	36	18
Palak and others	64	32
Other vegetables	**200**	**50**
Tomato	44	11
Cauliflower	24	6
Brinjal	34	8.5
Okra/Lady finger	16	4
Others	82	20.5
Fruits	**100**	**100**
Mango	14	14
Banana	56	56
Apple	11	11
Citrus	8	8
Others	11	11
Sugar	**20**	**15**
Fat	**25**	**25**
Tea leaves	**3**	**0**

Source: Dietary Guidelines for Indians, NIN, 2010.

Table 3.2 ADI/RfD of the Pesticides

S. No.	Name of Pesticide	JMPR ADI (per day per kg body weight)	EPA RfD (per day per kg body weight)
1	Phorate	0-0.0007 mg/kg, 2004	0.0005 mg/kg, 1993
2	Mancozeb	0.03 mg/kg, 1993	0.05 mg/kg, 2005
3	Methyl Parathion	0.003 mg/kg, 1995	0.00025 mg/kg, 1991
4	Cypermethrin	0-0.02 mg/kg, JECFA 2002	0.01 mg/kg, 1990
5	Carbendazim	0.03 mg/kg, 1995	0.025 mg/kg, 2005
6	Monocrotophos	0.0006 mg/kg, 1996	
7	Malathion	0-0.3 mg/kg, 1997	0.02 mg/kg, 1992
8	Quinalphos		0.0005 mg/kg body weight
9	Acephate	0-0.03 mg/kg, 2011	0.003 mg/kg, 1993
10	Triazophos	0-0.001 mg/kg (1993; confirmed 2002)	
11	Fenvalerate	0.02 mg/kg -1986	0.025 mg/kg, 1992
12	2,4 – D	0.01 mg/kg for sum of 2,4-D and its salts and esters expressed as 2,4-D, 1996	0.01 mg/kg, 1988
13	Captan	0-0.1 mg/kg 1984; confirmed 1990, 1995	0.13 mg/kg, 1989
14	Zineb	0.03 mg/kg, 1993	0.05 mg/kg, 1988
15	Paraquate Dichloride	0.006, mg/kg, 1986	0.0045, mg/kg,1991
16	Dichlorvos	0.004, mg/kg, 2011	0.0005, mg/kg, 1993
17	Dimethoate	0.002, mg/kg, 1996	0.0002, mg/kg, 1990
18	Chlorpyrifos	0.01, mg/kg, 1999	
19	Phosalone	0.02, mg/kg, 1997	
20	Carbofuran	0.001, mg/kg , 1996	0.005, mg/kg, 1987

recommended. Out of remaining 19 pesticides, TMDIs for seven pesticides were higher than ADI for an adult while TMDIs of nine pesticides were higher than ADIs for children. The TMDIs for Phorate, Methyl parathion, Monocrotophos, Captan, Dichlorvos, Dimethoate and Carbofuran were higher than ADIs for both children and adults.

The TMDIs for Phosalone and 2,4 - D were less than ADI for adults but were greater than the corresponding ADIs for children. The TMDI of Dimethoate and Monocrotophos were 19 and 16 times their ADIs respectively. The reference doses (RfD) were set for 16 pesticides out of 20 while RfDs for Monocrotophos, Triazophos, Chlorpyrifos and Phosalone were not set. The TMDIs of Phorate, Methyl Parathion, Malathion, Captan, Dichlorvos and Dimethoate were higher than corresponding RfDs for both adults and children. The TMDIs of Carbendazim and 2,4 D were higher than RfD for children only. The TMDIs of Dimethoate was 193 and 100 times higher than RfDs for children and adults respectively. The TMDIs for Cypermethrin were 53 and 35 times higher than its RfDs for adults and children respectively. Similarly, the TMDIs of Dichlorvos were 19 and 18 times higher than its RfDs for children and adults respectively. (Table 3.3 and 3.4)

Table 3.3. TMDIs' comparison with JMPR ADIs

Pesticide	ADI (mg/kg BW)	ADI (adult) (mg/day)	ADI (child) (mg/day)	TMDI (adult) (mg/day)	TMDI (child) (mg/day)	TMDI as % ADI (adult)	TMDI as % ADI (child)
Phorate	0.0007	0.042	0.00903	0.0564	0.0196	**134.3**	**217.1**
Mancozeb	0.03	1.8	0.387	0.565	0.354	31.4	91.5
Methyl Parathion	0.003	0.18	0.0387	0.52	0.17	**288.9**	**439.3**
Cypermethrin	0.02	1.2	0.258	0.0885	0.044	7.4	17.1
Carbendazim	0.03	1.8	0.387	0.71	0.355	39.4	91.7
Monocrotophos	0.0006	0.036	0.00774	0.17	0.122	**472.2**	**1576.2**
Malathion	0.3	18	3.87	3.756	1.266	20.9	32.7
Quinalphos		0	0	0.00176	0.00028		
Acephate	0.03	1.8	0.387	0.025	0.025	1.4	6.5
Triazophos	0.001	0.06	0.0129	0.0096	0.002	16.0	15.5
Fenvalerate	0.02	1.2	0.258	0.15	0.0384	12.5	14.9
2,4 – D	0.01	0.6	0.129	0.243	0.232	40.5	**179.8**
Captan	0.1	6	1.29	9	3.75	**150.0**	**290.7**
Zineb	0.03	1.8	0.387	0.565	0.354	31.4	91.45
Paraquate Dichloride	0.006	0.36	0.0774	0.0924	0.0258	25.7	33.3
Dichlorvos	0.004	0.24	0.0516	0.535	0.1225	**222.9**	**237.4**
Dimethoate	0.002	0.12	0.0258	1.2	0.5	**1000.0**	**1938**
Chlorpyrifos	0.01	0.6	0.129	0.13	0.07	21.7	54.3
Phosalone	0.02	1.2	0.258	0.864	0.59	72.0	**228.7**
Carbofuran	0.001	0.06	0.0129	0.122	0.03	**203.3**	**232.5**

Table 3.4. TMDIs' comparison with EPA RfDs

Pesticide	RfD	RfD (adult)	RfD (child)	TMDI (adult)	TMDI (child)	TMDI as % RfD (adult)	TMDI as % RfD (child)
Phorate	0.0005	0.03	0.00645	0.0564	0.0196	**188.0**	**303.9**
Mancozeb	0.05	3	0.645	0.565	0.354	18.8	54.9
Methyl Parathion	0.00025	0.015	0.003225	0.52	0.17	**3466.6**	**5271.3**
Cypermethrin	0.01	0.6	0.129	0.0885	0.044	14.7	34.1
Carbendazim	0.025	1.5	0.3225	0.71	0.355	47.3	**110.0**
Monocrotophos		0	0	0.17	0.122		
Malathion	0.02	1.2	0.258	3.756	1.266	**313.0**	**490.7**
Quinalphos	0.0005	0.03	0.00645	0.00176	0.00028	5.8	4.3
Acephate	0.003	0.18	0.0387	0.025	0.025	13.8	64.6
Triazophos		0	0	0.0096	0.00234		
Fenvalerate	0.025	1.5	0.3225	0.15	0.0384	10.0	11.9
2,4 – D	0.01	0.6	0.129	0.243	0.232	40.5	**179.8**
Captan	0.13	7.8	1.677	9	3.75	**115.4**	**223.6**
Zineb	0.05	3	0.645	0.565	0.354	18.8	54.8
Paraquate Dichloride	0.0045	0.27	0.05805	0.0924	0.0258	34.2	44.4
Dichlorvos	0.0005	0.03	0.00645	0.535	0.1225	**1783.3**	**1899.2**
Dimethoate	0.0002	0.012	0.00258	1.2	0.5	**10000.0**	**19379.8**
Chlorpyrifos		0	0	0.13	0.07		
Phosalone		0	0	0.864	0.59		
Carbofuran	0.005	0.3	0.0645	0.122	0.03	40.667	46.5

Case Studies

Sample calulations have been shown in the case studies. The cases of Methyl parathion and Monocrotophos have been considered (Table 3.5 and Table 3.6). The major groups of NIN diet have been further divided into common commodities. Wherever, the MRLs are set for major groups, they are multiplied with the overall quantitity of that group (like in Methyl parathion). In other cases where the MRLs of specific commodities are given, they are multiplied with the break quantities (as in roots and tubers tubers in Monocrotophos). The multiplication gives the intake of pesticide for a day from particular commodities or groups. Intake from all sources gives the TMDI, which has been compared with ADI and RfD.

The TMDIs of 10 pesticides were beyond the limits of ADI or RfD either for children or adults. These pesticides included Phorate, Methyl Parathion, Carbendazim, Monocrotophos, Malathion, 2, 4 – D, Captan, Dichlorvos, Dimethate and Carbofuran.

Table 3.5 TMDI caculation for Methyl Parathion

Food Commodity	Quantity (g/day)	MRL (mg/kg)	Intake (mg)
Cereals and millets	375		0
Rice	173		0
Wheat	139		0
Others	63		0
Pulses	75		0
Milk and milk products	309		0
Roots and tubers	**200**	**1**	**0.2**
Potato	116		0
Onion	62		0
Others	22		0
Green leafy vegetables	**100**	**1**	**0.1**
Cabbage	36		0
Palak and others	64		0
Other vegetables	**200**	**1**	**0.2**
Tomato	44		0
Cauliflower	24		0
Brinjal	34		0
Okra/Lady finger	16		0
Others	82		0
Fruits	**100**	**0.2**	**0.02**
Mango	14		0
Banana	56		0
Apple	11		0
Citrus	8		0
Others	11		0
Sugar	20		0
Fat	25		0
TMDI			0.52
ADI	0.003		0.18
TMDI as % ADI			**288.89**
RfD	0.00025		0.015
TMDI as % RfD			**3466.67**

Table 3.6 TMDI caculation for Monocrotophos

Food Commodity	Quantity (g/day)	MRL (mg/kg)	Intake (mg)
Cereals and millets	**375**	**0.0025**	**0.00094**
Rice	173		0
Wheat	139		0
Others	63		0
Pulses	**75**	**0.0025**	**0.00019**
Milk and milk products	**309**	**0.2**	**0.0018**
Roots and tubers	200		0
Potato	**116**	**0.05**	**0.0058**
Onion	**62**	**0.1**	**0.0062**
Others	**22**	**0.05**	**0.0011**
Green leafy vegetables	**100**	**0.2**	**0.02**
Cabbage	36		0
Palak and others	64		0
Other vegetables	**200**	**0.2**	**0.04**
Tomato	44		0
Cauliflower	24		0
Brinjal	34		0
Okra/Lady finger	16		0
Others	82		0
Fruits	100		0
Mango	**14**	**1**	**0.014**
Banana	**56**	**1**	**0.056**
Apple	**11**	**1**	**0.011**
Citrus	**8**	**0.2**	**0.0016**
Others	**11**	**1**	**0.011**
Sugar	20		0
Fat	25		0
TMDI			0.169
ADI		0.0006	0.036
TMDI as % ADI			**471.33**

3.2 Registration Procedure

The JPC had directed to discontinue the practice of registering pesticides without setting their MRLs. The CIBRC in reply to a query filed under Right to Information Act claimed that it had stopped the practice after August 2004[11]. The registration process, however, has no specific provision for ensuring setting of MRLs before registration of pesticides. In mid 2003, an effort was made to ensure that registration of a pesticide would simultaneously require MRLs for it to be fixed for various food products. It was decided in a meeting on June 2, 2003 under the chairmanship of the secretary (agriculture and cooperation) that pesticides would not be registered without fixing their MRLs.

The Registration Committee (RC), however, rejected the directive. The issue was discussed in 238th meeting of committee held on September 12, 2003 and it was decided that the committee would forward the data on pesticide being considered for registration to the Ministry of Health and Family Welfare and wait for the MRLs to be set for four weeks. In case of no response, the committee would go ahead with the registration as the setting of MRLs was a separate issue and could not be linked with registration.

In another meeting held on March 31, 2004 under the chairmanship of the additional secretary, ministry of agriculture, the issue of MRL was discussed and it was reiterated that pesticides would not be registered without their MRLs fixed. But the RC has continued to ignore the directive. An analysis showed that the RC went on to register pesticides without fixing MRLs in its subsequent meetings on April 2, 2004, May 27, 2004, and July 2, 2004 (243rd, 244th and 245th meetings of the committee respectively).

The RC has continuously rejected the need of setting MRLs on the grounds that it will delay the registration process. The current practice is to send that data of a pesticides to the ministry of health for setting the MRLs. The data in many cases are incomplete and hence the decisions are delayed. The RC can bypass the process in the meanwhile.

The system is run on ad hoc basis through correspondence between the concerned departments, with little information available in the public domain about its integrity. The Ministry of Agriculture sends information to the FSSAI about the pesticides that need MRLs. The FSSAI scientific panel meets and sets MRLs; the information is recorded in the minutes of the meeting, which is again not available in the public domain. The scientific committee then informs Ministry of Agriculture about its decision and the CIBRC subsequently issues registration letter to the company. However, the General Statutory Rule (GSR), which notifies the pesticide residue, is not issued before the registration is given (Annexure 2).

Status of JPC Recommendations

The JPC had required MRLs of all registered and deemed to be registered pesticides to be set. It also required review of the set MRLs for their compliance with ADI and the practice or registering pesticides without setting MRLs to be discontinued.

It is evident that recommendations have not been properly followed. The Food Safety and Standards Authority of India was formed in 2006. MRLs for all pesticides have not been set even after six years of the formation of authority. The existing MRLs have not been reviewed and the TMDIs of many pesticides considered in this study still exceed corresponding ADIs. The MRLs that have been set for the pesticides do not cover the recommendations made for them in most of the cases.

The registration process of pesticides does not have very sound provisions to ensure setting of MRLs before registration of pesticides. The information is not available in the public domain about the grounds on which the decision is taken.

4. Recommendations for Pesticides

CIBRC registers pesticides for specific crops. At second level, State Agricultural Universities and Departments make their own recommendations. These recommendations are mostly in form of package of practices for crops relevant to respective states. Few other bodies like the NHB and Spices Board of India also give recommendations for crops that fall under them. Uniformity among all these recommendations is required for ensuring food safety. Limiting pesticide residues in food products can only be ensured if the pesticides being used for corresponding crops are known. This will help in monitorng the residues of pesticides in crops. However, this can be possible only if there is uniformity between the pesticides registered by CIBRC and pesticides being used by the farmers.

It is mandatory for any manufacturer or importer seeking registration to provide the crop pest combination for which the pesticide can be recommended.

4.1 Comparison among various recommendations

In the present study, the pesticides registered by CIBRC for 11 crops Wheat, Paddy, Mango, Apple, Potato, Cauliflower, Black pepper, Cardamom, Tea, Sugarcane and Cotton were compared with the recommendations made by other relevant institutions. The other institutions include agriculture departments and agricultural universities of of the states that make significant contribution to the production of a particular crop. The boards that are deemed important in research on specific crops have also been included.

It was found that the recommendations made by the state agriculture universities did not necessarily stick to the pesticides that CIBRC had registered for particular crops. A number of pesticides were recommended by almost all agricultural universities and departments for different crops that were not registerd by CIBRC for these crops. An account of the same has been given below:

4.1.1. Wheat

CIBRC registered 38 pesticides for wheat. The recommendations made for wheat in Punjab, Haryana, Uttar Pradesh and Madhya Pradesh were compared with pesticides registered by CIBRC.

Punjab

The Punjab Agricultural University recommended 40 pesticides for wheat, of which, 11 pesticides were not registered by CIBRC (Table 4.1).

Table 4.1 Recommendation of Pesticides for Wheat in Punjab

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
38	**40**	**9**	**11**
2, 4 – D, Benomyl, Bitertanol, Bromadiolone, Carbendazim, Carbofuran, Carfentazone Ethyl, Chlorpyrifos, Clodinafop-propargyl, Cymoxanil, Cypermethrin, Deltamethrin, Dichlorvos, Diclofop Methyl, Endosulfan*, Iodosufuron Methyl Sodium, Isoproturon, Mancozeb, MCPA, Mesoulfuron Methyl, Methabenzthia Zuron, Methyl Parathion, Metribuzin, Metsulfuron Methyl, Paraquat Dichloride, Pendimethalin, Phorate, Propiconazole, Quinalphos, Sulfosulfuron, Tebuconazole, Thiamethoxam, Thiophanate methyl,Thiram, riadimefon, Triallate, Trichlorofon, Zineb	2, 4 – D, Bromadiolone, Carbendazim, Carfentazone Ethyl, Chlorpyrifos, Clodinafop-propargyl, Cypermethrin, Dichlorvos, Diclofop Methyl, Endosulfan*, Isoproturon, Mancozeb, Mesosulfuron, Methabenzthia Zuron, Methyl Parathion, Metribuzin, Metsulfuron Methyl, Pendimethalin, Phorate, Propiconazole, Quinalphos, Sulfosulfuron, Tebuconazole, Thiamethoxam, Thiram, Triadimefon, Triallate, Trichlorofon, Zineb, Chlothianidin, Captan, Carbaryl, Carboxin, Dimethoate, Fenoxaprop ethyl, Imidacloprid, Metsulfuron, Oxydemeton-Methyl, Pinoxaden, Trifluralin	Benomyl, Bitertanol, Carbofuran¸ Cymoxanil, Deltamethrin, Iodosufuron Methyl Sodium, MCPA, Paraquat Dichloride, Thiophanate methyl	Chlothianidin, Captan, Carbaryl, Carboxin, Dimethoate, Fenoxaprop ethyl, Imidacloprid, Metsulfuron, Oxydemeton-Methyl, Pinoxaden, Trifluralin

Source: Punjab Agriculture University recommendations for monthly work, 2011

Haryana

The Agriculture department of Haryana recommended 31 pesticides for wheat, of which five pesticides were not registered by CIBRC (Table 4.2).

Table 4.2 Recommendation of Pesticides for Wheat in Haryana

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
38	**31**	**12**	**5**
2, 4 – D, Benomyl, Bitertanol, Bromadiolone, Carbendazim, Carbofuran, Carfentazone Ethyl, Chlorpyrifos, Clodinafop-propargyl, Cymoxanil, Cypermethrin, Deltamethrin, Dichlorvos, Diclofop Methyl, Endosulfan*, Iodosufuron Methyl Sodium, Isoproturon, Mancozeb, MCPA, Mesoulfuron Methyl, Methabenzthia Zuron, Methyl Parathion, Metribuzin, Metsulfuron Methyl, Paraquat Dichloride, Pendimethalin, Phorate, Propiconazole, Quinalphos, Sulfosulfuron, Tebuconazole, Thiamethoxam, Thiophanate methyl, Thiram, Triadimefon, Triallate, Trichlorofon, Zineb	2, 4 – D, Bromadiolone Carbendazim, Chlorpyrifos, Clodinafop-propargyl, Cypermethrin, Dichlorvos, Diclofop Methyl, Endosulfan* Isoproturon, Mancozeb Methabenzthia Zuron, Methyl Parathion, Metribuzin, Metsulfuron Methyl, Pendimethalin Phorate, Propiconazole Quinalphos, Sulfosulfuron, Tebuconazole, Thiamethoxam, Thiram, Triadimefon, Trichlorofon, Zineb, Carboxin, Farmatheon, Fenitrothion, Malathion, Sulphur	Benomyl, Bitertanol, Carbofuran, Carfentazone Ethyl, Cymoxanil, Deltamethrin , Iodosufuron Methyl Sodium, MCPA, Mesoulfuron Methyl, Paraquat Dichloride, Thiophanate methyl	Carboxin, Farmatheon, Fenitrothion, Malathion, Sulphur

Source: Haryana Agriculture Department Website (http://agriharyana.nic.in/variouscrops.htm)

Uttar Pradesh

The Agriculture department of Uttar Pradesh recommended 23 pesticides for wheat, of which two pesticides were not registered by CIBRC (Table 4.3)

Table 4.3 Recommendation of Pesticides for Wheat in Uttar Pradesh

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
38	**23**	**17**	**2**
2, 4 – D, Benomyl, Bitertanol, Bromadiolone, Carbendazim, Carbofuran, Carfentazone Ethyl, Chlorpyrifos, Clodinafop-propargyl, Cymoxanil, Cypermethrin, Deltamethrin, Dichlorvos, Diclofop Methyl, Endosulfan*, Iodosufuron Methyl Sodium, Isoproturon, Mancozeb, MCPA, Mesoulfuron Methyl, Methabenzthia Zuron, Methyl Parathion, Metribuzin, Metsulfuron Methyl, Paraquat Dichloride, Pendimethalin, Phorate, Propiconazole, Quinalphos, Sulfosulfuron, Tebuconazole, Thiamethoxam, Thiophanate methyl, Thiram, Triadimefon, Triallate, Trichlorofon, Zineb,	2, 4 – D, Bromadiolone Carbendazim, Chlorpyrifos, Clodinafop-propargyl, Cypermethrin, Dichlorvos, Diclofop Methyl, Endosulfan* Isoproturon, Mancozeb Metribuzin, Pendimethalin, Phorate Propiconazole, Quinalphos, Sulfosulfuron, Thiram Triadimefon, Trichlorofon, Zineb Farmatheon, Dimethoate	Benomyl, Bitertanol, Carbofuran, Cymxanil, Carfentrazon ethyl, Deltamethrin , Iodosufuron Methyl Sodium, MCPA, Mesoulfuron Methyl, Methabenzthia Zuron, Methyl Parathion, Metsulfuron Methyl, Paraquat Dichloride, Tebuconazol, Thoaphanate methyl, Triallate, Thiamethoxam	Farmatheon, Dimethoate

Source: Uttar Pradesh Agriculture Department extension folder for wheat

Madhya Pradesh

The Agriculture department of Madhya Pradesh recommended 29 pesticides for wheat, of which nine pesticides were not registered by CIBRC (Table 4.4).

Table 4.4 Recommendation of Pesticides for Wheat in Madhya Pradesh

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
38	**29**	**18**	**9**
2, 4 – D, Benomyl, Bitertanol, Bromadiolone, Carbendazim, Carbofuran, Carfentazone Ethyl, Chlorpyrifos, Clodinafop-propargyl, Cymoxanil, Cypermethrin, Deltamethrin, Dichlorvos, Diclofop Methyl, Endosulfan*, Iodosufuron Methyl Sodium, Isoproturon, Mancozeb, MCPA, Mesoulfuron Methyl, Methabenzthia Zuron, Methyl Parathion, Metribuzin, Metsulfuron Methyl, Paraquat Dichloride, Pendimethalin, Phorate, Propiconazole, Quinalphos, Sulfosulfuron, Tebuconazole, Thiamethoxam, Thiophanate methyl, Thiram, Triadimefon, Triallate, Trichlorofon, Zineb,	2, 4 – D, Bromadiolone Carbendazim, Chlorpyrifos, Clodinafop-propargyl Cypermethrin, Dichlorvos, Diclofop Methyl, Endosulfan*, Isoproturon, Mancozeb Metribuzin, Pendimethalin, Phorate, Propiconazole, Quinalphos, Sulfosulfuron, Thiram, Triadimefon, Trichlorofon, Dimethoate Heptachlor, Zinc Phosphide, Methyl Dematon, Oxydemeton methyl, Carboxin, Monocrotophos, Copper Oxychloride, Fenoxaprop	Benomyl, Bitertanol, Carbofuran, Carfentazone Ethyl, Cymoxanil, Deltamethrin, Iodosufuron Methyl Sodium, MCPA, Mesoulfuron Methyl, Methabenzthia Zuron, Methyl Parathion, Metsulfuron Methyl, Paraquat Dichloride, Tebuconazole, Thiamethoxam, Thiophanate methyl, Triallate, Zineb	Dimethoate, Heptachlor, Zinc Phosphide, Methyl Dematon, Oxydemeton methyl, Carboxin, Monocrotophos, Copper Oxychloride, Fenoxaprop

Source: Madhya Pradesh Agriculture Department Website (http://mpkrishi.org/krishinet/HindiSite/krishi_pranaliya_rabi_gehu.asp)

4.1.2. Paddy

CIBRC had registered 78 pesticides for paddy. The recommendations made for paddy in the states of Uttar Pradesh, Tamil Nadu, Punja and Bihar were compared with the pesticides registered by CIBRC.

Uttar Pradesh

The Agriculture department of Uttar Pradesh recommended 40 pesticides for paddy, of which eight pesticides were not registered by CIBRC (Table 4.5).

Table 4.5 Recommendation of Pesticides for Paddy in Uttar Pradesh

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
78	**40**	**46**	**8**
2,4-D, Acephate, Anilofos, Aureofungin, Azadirachtin Benfuracarb, Bensulfuron Methyl, Bispyribac Sodium, Bromadiolone, Buprofezin Butachlor, Captan, Carbaryl Carbendazim, Carbofuran, Carbosulfan, Carpropamid Cartap Hydrochloride, Chlorantraniliprole, Chlorimuron ethyl, Chlorpyrifos, Chlothiandin, Cinmethylin, Clomazone Copper hydroxide, Cyhalothrin, Cypermethrin, Deltamethrin, Dichlorvos, Difenoconazole, Ediphenphos, Endosulfan* Ethofenoprox, Ethoxysulfuron, Fenobucarb, Fenoxaprop-p-Ethyl, Fipronil, Flubendiamide, Flufenacet, Flusilazole, Hexaconazole, Imidacloprid, Iprodione, Isoprothiolane, Kasugamycin, Kitazin, Kresoxim-methyl, Lambda-Cyhalothrin, Mancozeb, MCPA-Amine salt, Metaldehyde, Methyl Parathion, Metsulfuron Methyl, Monocrotophos, Oxadiargyl, Oxadiazon, Oxydemeton – methyl , Oxyflourfon, Paraquat Dichloride, Pencycuron, Pendimethalin, Phenthoate, Phorate, Phosalone, Phosphamidon, Pretilachlor, Propiconazole, Propineb, Quinalphos, Tebuconazole, Thiacloprid, Thiamethoxam, Thifluzamide, Thiram, Triazophos, Tricyclazole, Validamycin, Zineb	2,4-D, Anilofos, Bensulfuron Methyl, Butachlor, Captan, Carbaryl, Carbendazim, Carbofuran, Cartap Hydrochloride, Chlorpyrifos, Cypermethrin, Dichlorvos, Ediphenphos, Endosulfan*, Ethoxysulfuron, Hexaconazole, Imidacloprid, Iprodione, Mancozeb, Methyl Parathion, Mesosulfuron Methyl, Monocrotophos, Oxadiargyl, Pendimethylene, Phosphamidon, Pretilachlor, Propiconazole, Quinalphos, Thiamethoxam, Thiram, Triazophos, Tricyclazole, Fenvalerate, Fenthroate, Copper oxychloride, Ziram, Bendiocarb, Pyrazosulfuran, Thiobencarb, Thiophanate-Methyl,	Acephate, Aureofungin, Azadirachtin, Benfuracarb, Bispyribac Sodium, Bromadiolone, Buprofezin, Carbosulfan, Carpropamid, Chlorantraniliprole, Chlorimuron ethyl, Chlothiandin, Cinmethylin, Clomazone, Copper hydroxide, Cyhalothrin, Deltamethrin, Difenoconazole, Ethofenoprox, Fenobucarb, Fenoxaprop-p-Ethyl, Fipronil, Flubendiamide, Flufenacet, Flusilazole, Isoprothiolane, Kasugamycin, Kitazin, Kresoxim-methyl, Lambda-Cyhalothrin, MCPA- Amine salt, Metaldehyde, Oxadiazon, Oxydemeton – methyl, Oxyflourfon, Paraquat Dichloride, Pencycuron, Phenthoate, Phorate, Phosalone, Propineb, Tebuconazole, Thiacloprid, Thifluzamide, Validamycin and Zineb	Fenvalerate, Fenthroate, Copper oxychloride, Ziram, Bendiocard, Pyrazosulfuran, Thiobencarb, Thiophanate-methyl

Source: Sanghatan Paddhatiyan, Uttar Pradesh Agriculture Department, 2011

Tamil Nadu

The Agriculture department of Tamil Nadu recommended 30 pesticides for paddy, of which eight pesticides were not registered by CIBRC (Table 4.6).

Table 4.6 Recommendation of Pesticides for Paddy in Tamil Nadu

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
78	**30**	**56**	**8**
2,4-D, Acephate, Anilofos, Aureofungin, Azadirachtin Benfuracarb, Bensulfuron Methyl, Bispyribac Sodium, Bromadiolone, Buprofezin Butachlor, Captan, Carbaryl Carbendazim, Carbofuran, Carbosulfan, Carpropamid Cartap Hydrochloride, Chlorantraniliprole, Chlorimuron ethyl, Chlorpyrifos, Chlothiandin, Cinmethylin, Clomazone Copper hydroxide, Cyhalothrin, Cypermethrin, Deltamethrin, Dichlorvos, Difenoconazole, Ediphenphos, Endosulfan* Ethofenoprox, Ethoxysulfuron, Fenobucarb, Fenoxaprop-p-Ethyl, Fipronil, Flubendiamide, Flufenacet, Flusilazole, Hexaconazole, Imidacloprid, Iprodione, Isoprothiolane, Kasugamycin, Kitazin, Kresoxim-methyl, Lambda-Cyhalothrin, Mancozeb, MCPA-Amine salt, Metaldehyde, Methyl Parathion, Metsulfuron Methyl, Monocrotophos, Oxadiargyl, Oxadiazon, Oxydemeton – methyl , Oxyflourfon, Paraquat Dichloride, Pencycuron, Pendimethalin, Phenthoate, Phorate, Phosalone, Phosphamidon, Pretilachlor, Propiconazole, Propineb, Quinalphos, Tebuconazole, Thiacloprid, Thiamethoxam, Thifluzamide, Thiram, Triazophos, Tricyclazole, Validamycin, Zineb	2,4-D, Butachlor, Captan, Carbaryl, Carbendazim, Carbofuran, Chlorpyrifos, Dichlorvos, Ediphenphos, Endosulfan*, Hexaconazole, Imidacloprid, Iprodione, Mancozeb, Methyl Parathion, Monocrotophos, Phosphamidon, Propiconazole, Quinalphos, Thiamethoxam, Thiram, Tricyclazole, Profenophos, BHC, Fenthion, Malathion, Dimethoate, Methyl Demeton, Benomyl, Copper Oxychloride	Acephate, Aureofungin, Anilofos, Azadirachtin, Benfuracarb, Bensulfuron Methyl, Bispyribac Sodium, Bromadiolone, Buprofezin, Carbosulfan, Carpropamid, Cartap Hydrochloride, Chlorantraniliprole, Chlothiandin, Cinmethylin, Clomazone, Copper hydroxide, Cyhalothrin, Cypermethrin, Deltamethrin, Difenoconazole, Ethofenoprox, Ethoxysulfuron, Fenobucarb, Fenoxaprop-p-Ethyl, Fipronil, Flubendiamide, Flufenacet, Flusilazole, Isoprothiolane, Kasugamycin, Kitazin, Kresoxim-methyl, Lambda-Cyhalothrin, MCPA-Amine salt, Metaldehyde, Metsulfuron Methyl, Oxadiargyl, Oxadiazon, Oxydemeton – methyl, Oxyflourfon, Paraquat Dichloride, Pencycuron, Pendimethalin, Phenthoate, Phorate, Phosalone, Pretilachlor, Propineb, Tebuconazole, Thiacloprid, Thifluzamide, Triazophos, Validamycin and Zineb	Profnophos, BHC, Fenthion, Malathion, Dimethoate, Methyl Demeton, Benomyl, Copper oxychloride

Source: Tamil Nadu Agriculture University Agritech Portal (http://agritech.tnau.ac.in/agriculture/agri_cropproduction_cereals_rice.html)

Punjab

The Punjab Agricultural University recommended 22 pesticides for paddy, of which sixpesticides were not registered by CIBRC (Table 4.7).

Table 4.7 Recommendation of Pesticides for Paddy in Punjab

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
78	**22**	**62**	**6**
2,4-D, Acephate, Anilofos, Aureofungin, Azadirachtin Benfuracarb, Bensulfuron Methyl, Bispyribac Sodium, Bromadiolone, Buprofezin Butachlor, Captan, Carbaryl Carbendazim, Carbofuran, Carbosulfan, Carpropamid Cartap Hydrochloride, Chlorantraniliprole, Chlorimuron ethyl, Chlorpyrifos, Chlothiandin, Cinmethylin, Clomazone Copper hydroxide, Cyhalothrin, Cypermethrin, Deltamethrin, Dichlorvos, Difenoconazole, Ediphenphos, Endosulfan* Ethofenoprox, Ethoxysulfuron, Fenobucarb, Fenoxaprop-p-Ethyl, Fipronil, Flubendiamide, Flufenacet, Flusilazole, Hexaconazole, Imidacloprid, Iprodione, Isoprothiolane, Kasugamycin, Kitazin, Kresoxim-methyl, Lambda-Cyhalothrin, Mancozeb, MCPA-Amine salt, Metaldehyde, Methyl Parathion, Metsulfuron Methyl, Monocrotophos, Oxadiargyl, Oxadiazon, Oxydemeton – methyl , Oxyflourfon, Paraquat Dichloride, Pencycuron, Pendimethalin, Phenthoate, Phorate, Phosalone, Phosphamidon, Pretilachlor, Propiconazole, Propineb, Quinalphos, Tebuconazole, Thiacloprid, Thiamethoxam, Thifluzamide, Thiram, Triazophos, Tricyclazole, Validamycin, Zineb	Anilofos, Bensulfuron, Methyl Butachlor, Carbendazim, Chlorpyrifos, Endosulfan*, Ethoxysulfuron, Fipronil, Metsulfuron Methyl, Monocrotophos, Oxadiargyl, Pendimethelene, Pretilachlor, Propiconazole, Quinalphos, Triazophos, Carboxin, Copper Oxychloride, Pyrazosulfuron ethyl, Sethoxydim, Thiobendcarb, Pencycuron	2, 4 – D, Acephate, Aureofungin, Azadirachtin, Benfuracarb, Bispyribac Sodium, Bromadiolone, Buprofezin, Captan, Carbaryl, Carbofuran, Carbosulfan, Carpropamid, Cartap Hydrochloride, Chlorantraniliprole, Chlorimuron ethyl, Chlothiandin, Cinmethylin, Clomazone, Copper hydroxide, Cyhalothrin, Cypermethrin, Deltamethrin, Dichlorvos, Difenoconazole, Ediphenphos, Ethofenoprox, Fenobucarb, Fenoxaprop-p-Ethyl, Flubendiamide, Flufenacet, Flusilazole, Hexaconazole, Imidacloprid, Iprodione, Isoprothiolane, Kasugamycin, Kitazin, Kresoxim-methyl, Lambda-Cyhalothrin, Mancozeb, MCPA- Amine salt, Metaldehyde, Methyl Parathion, Oxadiazon, Oxydemeton – methyl, Oxyflourfon, Paraquat Dichloride, Pencycuron, Phenthoate, Phorate, Phosalone, Phosphamidon, Propineb, Tebuconazole, Thiacloprid, Thiamethoxam, Thifluzamide, Thiram, Tricyclazole, Validamycin, Zineb	Carboxin, Copper Oxychloride, Pyrazosulfuron ethyl, Sethoxydim, Thiobendcarb, Pencycuron

Source: Punjab Agriculture University recommendations for monthly work, 2011

Bihar

The Agriculture department of Bihar recommended 13 pesticides for paddy, of which one pesticide was not registered by CIBRC (Table 4.8).

Table 4.8 Recommendation of Pesticides for Paddy in Bihar

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
78	**13**	**66**	**1**
2,4-D, Acephate, Anilofos, Aureofungin, Azadirachtin Benfuracarb, Bensulfuron Methyl, Bispyribac Sodium, Bromadiolone, Buprofezin Butachlor, Captan, Carbaryl Carbendazim, Carbofuran, Carbosulfan, Carpropamid Cartap Hydrochloride, Chlorantraniliprole, Chlorimuron ethyl, Chlorpyrifos, Chlothiandin, Cinmethylin, Clomazone Copper hydroxide, Cyhalothrin, Cypermethrin, Deltamethrin, Dichlorvos, Difenoconazole, Ediphenphos, Endosulfan* Ethofenoprox, Ethoxysulfuron, Fenobucarb, Fenoxaprop-p-Ethyl, Fipronil, Flubendiamide, Flufenacet, Flusilazole, Hexaconazole, Imidacloprid, Iprodione, Isoprothiolane, Kasugamycin, Kitazin, Kresoxim-methyl, Lambda-Cyhalothrin, Mancozeb, MCPA-Amine salt, Metaldehyde, Methyl Parathion, Metsulfuron Methyl, Monocrotophos, Oxadiargyl, Oxadiazon, Oxydemeton – methyl , Oxyflourfon, Paraquat Dichloride, Pencycuron, Pendimethalin, Phenthoate, Phorate, Phosalone, Phosphamidon, Pretilachlor, Propiconazole, Propineb, Quinalphos, Tebuconazole, Thiacloprid, Thiamethoxam, Thifluzamide, Thiram, Triazophos, Tricyclazole, Validamycin, Zineb	2,4-D, Butachlor, Carbendazim, Carbofuran, Chlorpyrifos, Endosulfan*, Hexaconazole, Imidacloprid, Methyl parathion, Phorate, Pretilachlor, Tricyclazole, Malathion	Acephate, Anilofos, Aureofungin, Azadirachtin, Benfuracarb, Bensulfuron Methyl, Bispyribac Sodium, Bromadiolone, Buprofezin, Captan, Carbaryl, Carbosulfan, Carpropamid, Cartap Hydrochloride, Chlorantraniliprole, Chlorimuron ethyl, Chlothiandin, Cinmethylin, Clomazone, Copper hydroxide, Cyhalothrin, Cypermethrin, Deltamethrin, Dichlorvos, Difenoconazole, Ediphenphos, Ethofenoprox, Ethoxysulfuron, Fenobucarb, Fenoxaprop-p-Ethyl, Fipronil, Flubendiamide, Flufenacet, Flusilazole, Iprodione, Isoprothiolane, Kasugamycin, Kitazin, Kresoxim-methyl, Lambda-Cyhalothrin, Mancozeb, MCPA- Amine salt, Metaldehyde, Metsulfuron Methyl, Monocrotophos, Oxadiargyl, Oxadiazon, Oxydemeton – methyl, Oxyflourfon, Paraquat Dichloride, Pencycuron, Pendimethalin, Phenthoate, Phosalone, Phosphamidon, Propiconazole, Propineb, Quinalphos, Tebuconazole, Thiacloprid, Thiamethoxam, Thifluzamide, Thiram, Triazophos, Validamycin and Zineb	Malathion

Source: Bihar Agriculture Department, Package of Practices for Paddy, 2009-10

4.1.3. Apple

CIBRC registered 34 pesticides for apple. The recommendations made for apple by National Horticultural Board and in the states of Himachal Pradesh, Jammu & Kashmir and Tamil Nadu were compared with the pesticides registered by CIBRC.

National Horticulture Board

NHB recommended 19 pesticides for apple, of which eight pesticides were not registered by CIBRC (Table 4.9).

Table 4.9 Recommendation of Pesticides for Apple by NHB

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
34	**19**	**23**	**8**
Aureofungin, Bitertanol, Captan, Carbendazim, Carbofuran, Chlorothalonil, Chlorpyrifos, Dichlorvos, Difenoconazole, Dimethoate, Dinocap, Dithianon, Dodine, Fenarimol, Fenazaquin, Flusilazole, Hexaconazole, Lime sulphur, Malathion, Mancozeb, Myclobutanil, Oxydemeton – methyl, Paraquat dichloride, Penconazole, Phorate, Propargite, Propineb, Quinalphos, Spiromesifen, Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiophanate Methyl, Ziram	Bitertanol, Captan, Carbendazim, Chlorpyrifos, Dinocap, Hexaconazole, Malathion, Mancozeb, Streptomycin, Sulphur, Thiophanate Methyl, Phosphamidon, Fenetrothion, Dicofol, Diazinon, Simazine, Nitrofen, Atrazine, Terbacil	Aureofungin, Carbofuran, Chlorothalonil, Dichlorvos, Difenoconazole, Dimethoate, Dithianon, Dodine, Fenarimol, Fenazaquin, Flusilazole, Lime Sulphur, Myclobutanil, Oxydemeton – methyl, Paraquat dichloride, Penconazole, Phorate, Propargite, Propineb, Quinalphos, Spiromesifen, Tetracylin Hydrocloride, Ziram.	Phosphamidon, Fenetrothion, Dicofol, Diazinon, Simazin, Nitrofen, Atrazin, Terbacil

Source: National Horticultural Board website (http://nhb.gov.in/bulletin-fruits.html)

Himachal Pradesh

Dr. Y S Parmar University of Horticulture and Forestry, Solan recommended 19 pesticides for apple, of which six pesticides were not registered by CIBRC (Table 4.10).

Table 4.10 Recommendation of Pesticides for Apple in Himachal Pradesh

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
34	**7**	**33**	**6**
Aureofungin, Bitertanol, Captan, Carbendazim, Carbofuran, Chlorothalonil, Chlorpyrifos, Dichlorvos, Difenoconazole, Dimethoate, Dinocap, Dithianon, Dodine, Fenarimol, Fenazaquin, Flusilazole, Hexaconazole, Lime sulphur, Malathion, Mancozeb, Myclobutanil, Oxydemeton – methyl, Paraquat dichloride, Penconazole, Phorate, Propargite, Propineb, Quinalphos, Spiromesifen, Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiophanate Methyl, Ziram	Paraquat dichloride, Hydrogen Cynamide, Nepthalene acetic acid, Copper oxychloride, Glyphosate, Monosodium acid methanearsonate, Carbaryl	Aureofungin, Bitertanol , Carbofuran, Captan , Carbendazim, Chlorothalonil, Chlorpyrifos , Dichlorvos, Difenoconazole, Dimethoate, Dinocap, Dithianon, Dodine, Fenarimol, Fenazaquin, Flusilazole, Hexaconazole, Lime Sulphur, Myclobutanil, Malathion , Mancozeb , Oxydemeton – methyl, Penconazole, Phorate, Propargite, Propineb, Quinalphos, Spiromesifen, Streptomycin, Sulphur, Tetracylin Hydrocloride, Thiophanate Methyl, Ziram.	Hydrogen Cynamide, Nepthalene acetic acid, Copper oxychloride, Glyphosate, Monosodium acid methanearsonate, Carbaryl

Source: Fal Utpadan avam Sanrakshan, Dr.YS Parmar University of Horticulture and Forestry, 2009

Jammu and Kashmir

Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu recommended 19 pesticides for apple, of which two pesticides were not registered by CIBRC (Table 4.11).

Table 4.11 Recommendation of Pesticides for Apple in Jammu & Kashmir

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
34	**6**	**30**	**2**
Aureofungin, Bitertanol, Captan, Carbendazim, Carbofuran, Chlorothalonil, Chlorpyrifos, Dichlorvos, Difenoconazole, Dimethoate, Dinocap, Dithianon, Dodine, Fenarimol, Fenazaquin, Flusilazole, Hexaconazole, Lime sulphur, Malathion, Mancozeb, Myclobutanil, Oxydemeton – methyl, Paraquat dichloride, Penconazole, Phorate, Propargite, Propineb, Quinalphos, Spiromesifen, Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiophanate Methyl, Ziram	Dithianon, Hexaconazole, Mancozeb, Penconazole, Imidacloprid, Benomyl,	Aureofungin, Bitertanol , Carbofuran, Captan , Carbendazim, Chlorothalonil, Chlorpyrifos , Dichlorvos, Difenoconazole, Dimethoate, Dinocap, Dodine, Fenarimol, Fenazaquin, Flusilazole, Lime Sulphur, Myclobutanil, Malathion , Oxydemeton – methyl, Phorate, Propargite, Propineb, Paraquate dichloride, Quinalphos, Spiromesifen, Streptomycin, Sulphur, Tetracylin Hydrocloride, Thiophanate Methyl, Ziram	Imidacloprid, Benomyl

Source: Annual Report 2010-11, Sher-E-Kashmir University of Agricultural Sciences and Technology of Jammu

Tamil Nadu

Tamil Nadu Agricultural University recommended five pesticides for apple, of which two pesticides were not registered by CIBRC (Table 4.12).

Table 4.12 Recommendation of Pesticides for Apple in Tamil Nadu

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
34	**5**	**31**	**2**
Aureofungin, Bitertanol, Captan, Carbendazim, Carbofuran, Chlorothalonil, Chlorpyrifos, Dichlorvos, Difenoconazole, Dimethoate, Dinocap, Dithianon, Dodine, Fenarimol, Fenazaquin, Flusilazole, Hexaconazole, Lime sulphur, Malathion, Mancozeb, Myclobutanil, Oxydemeton – methyl, Paraquat dichloride, Penconazole, Phorate, Propargite, Propineb, Quinalphos, Spiromesifen, Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiophanate Methyl, Ziram	Captan, Carbendazim, Mancozeb, Methyl Demeton, Captafol	Aureofungin, Bitertanol, Carbofuran, Chlorothalonil, Chlorpyrifos , Dichlorvos, Difenoconazole, Dimethoate, Dinocap, Dithianon, Dodine, Fenarimol, Fenazaquin, Flusilazole, Hexaconazole, Lime Sulphur, Malathion, Myclobutanil, Oxydemeton – methyl, Paraquat dichloride, Penconazole, Phorate, Propargite, Propineb, Quinalphos, Spiromesifen, Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiophanate Methyl, Ziram	Methyl Demeton, Captafol

Source: Tamil Nadu Agriculture University Agritech Portal (http://agritech.tnau.ac.in/horticulture/horti_fruits_apple.html)

4.1.4. Mango

CIBRC recommended 18 pesticides for mango. The recommendations for mango by NHB and in the states of Maharashtra, Tamil Nadu and Uttar Pradesh were compared with the pesticides registered by CIBRC.

National Horticulture Board

NHB recommended 18 pesticides for mango, of which nine pesticides were not registered by CIBRC (Table 4.13).

Table 4.13 Recommendation of Pesticides for Mango by NHB

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
18	**16**	**11**	**9**
Azoxystrobin, Buprofezin, Carbendazim, Copper Oxychloride, Deltamethrin, Dimethoate, Dinocap, Hexaconazole, Imidacloprid, Lambda-Cyhalothrin, Malathion, Monocrotophos, Oxydemeton – methyl, Penconazole, Quinalphos, Sulphur, Thiamethoxam, Triadimefon	Carbendazim, Copper oxychloride, Dimethoate, Monocrotophos, Oxydemeton – methyl, Quinalphos, Sulphur, Carbaryl, Dichlorvas, Fenetrothion, Fenthion, Heptachlor, Methyl Parathion, Tridemorph, Zineb, Benomyl	Azoxystrobin, Buprofezin, Deltamethrin, Dinocap, Hexaconazole, Imidacloprid, Lambda-Cyhalothrin, Malathion, Penconazole, Thiamethoxam, Triadimefon	Carbaryl, Dichlorvas, Fenetrothion, Fenthion, Heptachlor, Methyl Parathion, Tridemorph, Zineb, Benomyl

Source: National Horticultural Board Website (http://nhb.gov.in/bulletin-fruits.html)

Maharashtra

Dr. Bala Saheb Sawant Konkan Agricultural University, Dapoli recommended 21 pesticides for mango, of which 15 pesticides were not registered by CIBRC (Table 4.14).

Table 4.14 Recommendation of Pesticides for Mango in Maharashtra

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
18	**21**	**11**	**15**
Azoxystrobin,Buprofezin, Carbendazim, Copper Oxychloride, Deltamethrin, Dimethoate,Dinocap,Hexaconazole, Imidacloprid, Lambda-Cyhalothrin, Malathion,Monocrotophos, Oxydemeton – methyl,Penconazole,Quinalphos, Sulphur, Thiamethoxam, Triadimefon	Carbendazim, Copper oxychloride, Deltamethrin, Imidacloprid, Monocrotophos, Quinalphos, Thiamethaxam, Aluminium Phosphide, Carbaryl, Chlorpyrifos, Cypermethrin, Dimethoate, EDCT mixture, Endosulfan*, Fenvalerate, Methyl parathion, Nimbecidine, Phenthoate, Glyphosate, Butachlor, Fluchloralin, Methyl demeton	Azoxystrobin, Buprofezin, Dimethoate Dinocap, Hexaconazole, Lambda-Cyhalothrin, Malathion, Penconazole, Sulphur, Triadimefon, Oxydemeton-methyl	Aluminium Phosphide, Carbaryl, Chlorpyrifos, Cypermethrin, Dimethoate, EDCT mixture, Endosulfan*, Fenvalerate, Methyl parathion, Nimbecidine, Phenthoate, Glyphosate, Butachlor, Fluchloralin, Methyl Demeton,

Source: Krishi Dainandini, Dr. B S Sawant Konkan Agriculture University, Dapoli

Tamil Nadu

Tamil Nadu Agricultural University recommended 17 pesticides for mango, of which 11 pesticides were not registered by CIBRC (Table 4.15).

Table 4.15 Recommendation of Pesticides for Mango in Tamil Nadu

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
18	**17**	**12**	**11**
Azoxystrobin, Buprofezin, Carbendazim, Copper Oxychloride, Deltamethrin, Dimethoate, Dinocap, Hexaconazole, Imidacloprid, Lambda-Cyhalothrin, Malathion, Monocrotophos, Oxydemeton – methyl, Penconazole, Quinalphos, Sulphur, Thiamethoxam, Triadimefon,	Carbendazim, Copper oxychloride, Dimethoate, Malathion, Monocrotophos, Methyl Demeton, Sulphur, Carbaryl, Carbofuran, Chlorpyrifos, Fenthion, Phosalone, Phosphamidon, Mancozeb, Thiophanate methyl, Chlorothalonil, Copper sulphate	Azoxystrobin, Buprofezin, Deltamethrin, Dinocap, Hexaconazole, Imidacloprid, Lambda-Cyhalothrin, Penconazole, Quinalphos, Triadimefon, Thiamethoxam, Oxydemeton methyl	Carbaryl, Carbofuran, Chlorpyrifos, Fenthion, Phosalone, Phosphamidon, Mancozeb, Thiophanate methyl, Chlorothalonil, Copper sulphate, Methyl demeton

Source: Tamil Nadu Agricutural University Agritech Portal (http://agritech.tnau.ac.in/horticulture/horti_fruits_mango.html)

Uttar Pradesh

The agriculture department of Uttar Pradesh recommended 12 pesticides for mango, of which 8 pesticides were not registered by CIBRC (Table 4.16).

Table 4.16 Recommendation of Pesticides for Mango in Uttar Pradesh

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
18	**12**	**14**	**8**
Azoxystrobin, Buprofezin, Carbendazim, Copper Oxychloride, Deltamethrin, Dimethoate, Dinocap, Hexaconazole, Imidacloprid, Lambda-Cyhalothrin, Malathion, Monocrotophos, Oxydemeton – methyl, Penconazole, Quinalphos, Sulphur, Thiamethoxam, Triadimefon	Dimethoate, Dinocap, Monocrotophos, Methyl Demeton, Quinalphos, Aluminium Phosphide, Carbaryl, Diclorvos, Endosulfan*, Methyl Parathion, Borax, Copper Sulphate	Azoxystrobin, Buprofezin, Carbendazim, Copper Oxychloride, Deltamethrin, Hexaconazole, Imidacloprid, Lambda-Cyhalothrin, Malathion, Penconazole,Sulphur, Triadimefon, Thiamethoxam, Oxydemeton methyl	Aluminium Phosphide, Carbaryl, Diclorvos, Endosulfan*, Borax, Copper Sulphate, Methyl Parathion, Oxydemeton methyl

Source: Krishi Gyan Manjusha, 6th Edition, UP Agriculture Department

4.1.5 Cauliflower

CIBRC recommended 14 pesticides for cauliflower. The recommendations made for cauliflower by NHB and in the states of Bihar, Andhra Pradesh and Uttar Pradesh were compared with the pesticides registered by CIBRC.

National Horticulture Board

NHB recommended 7 pesticides for cauliflower, of which 6 pesticides were not registered by CIBRC (Table 4.17).

Table 4.17 Recommendation of Pesticides for Cauliflower by NHB

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
14	**7**	**13**	**6**
Azadirachtin, Captan, Carbaryl, Dimethoate, Fenvalerate, Lufenuron, Malathion, Mancozeb, Permethrin, Phorate, Quinalphos, Spinosad, Trichlorofon, Zineb	Malathion, Profenofos, Diclorvos, Streptomycin, Streptocycline, Fluchloralin, Nitrofen	Azadirachtin, Captan, Carbaryl, Dimethoate, Fenvalerate, Lufenuron, Mancozeb, Permethrin, Phorate, Quinalphos, Spinosad, Trichlorofon, Zineb	Profenofos, Diclorvos, Streptomycin, Streptocycline, Fluchloralin, Nitrofen

Source: National Horticultural Board Website (http://nhb.gov.in/bulletin-vegetables.html)

Bihar

The Bihar agriculture department recommended 8 pesticides for cauliflower, of which six pesticides were not registered by CIBRC (Table 4.18).

Table 4.18 Recommendation of Pesticides for Cauliflower in Bihar

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
14	**8**	**12**	**6**
Azadirachtin, Captan, Carbaryl, Dimethoate, Fenvalerate, Lufenuron, Malathion, Mancozeb, Permethrin, Phorate, Quinalphos, Spinosad, Trichlorofon, Zineb	Dimethoate, Mancozeb, Monocrotophos, Endosulfan*, Streptomycin, Tetracycline, Copper Oxychloride, Pendimethalin	Azadirachtin, Captan, Carbaryl, Fenvalerate, Lufenuron, Malathion, Permethrin, Phorate, Quinalphos, Spinosad, Trichlorofon, Zineb	Monocrotophos, Endosulfan*, Streptomycin, Tetracycline, Copper Oxychloride, Pendimethalin

Source: Udyan Sandesh-2, Bihar Agriculture Department

Andhra Pradesh

The Horticultural University of Andhra Pradesh recommended 13 pesticides for cauliflower, of which nine pesticides were not registered by CIBRC (Table 4.19).

Table 4.19 Recommendation of Pesticides for Cauliflower in Andhra Pradesh

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
14	**13**	**10**	**9**
Azadirachtin, Captan, Carbaryl, Dimethoate, Fenvalerate, Lufenuron, Malathion, Mancozeb, Permethrin, Phorate, Quinalphos, Spinosad, Trichlorofon, Zineb	Carbaryl, Dimethoate, Malathion, Quinalphos, Monocrotophos, Endosulfan*, Fenitrothion, Phosalone, Phosphamidon, Streptocycline, Copper Oxychloride, Mercuric Chloride, Thiram	Azadirachtin, Captan, Fenvalerate, Lufenuron, Mancozeb, Permethrin, Phorate, Spinosad, Trichlorofon, Zineb	Monocrotophos, Endosulfan*, Fenitrothion, Phosalone, Phosphamidon, streptocycline, Copper Oxychloride, Mercuric Chloride, Thiram

Source: Package of Practices of the Important Horticultural Crops of Andhra Pradesh, 2010, Andhra Pradesh Horticultural University

Uttar Pradesh

The agriculture department of Uttar Pradesh recommended 6 pesticides for cauliflower, of which one pesticide was not registered by CIBRC (Table 4.20).

Table 4.20 Recommendation of Pesticides for Cauliflower in Uttar Pradesh

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
14	**6**	**9**	**1**
Azadirachtin, Captan, Carbaryl, Dimethoate, Fenvalerate, Lufenuron, Malathion, Mancozeb, Permethrin, Phorate, Quinalphos, Spinosad, Trichlorofon, Zineb	Captan, Carbaryl, Malathion, Mancozeb, Zineb,Carbendazim	Azadirachtin, Dimethoate, Fenvalerate, Lufenuron, Permethrin, Phorate, Quinalphos, Spinosad, Trichlorofon,	Carbendazim

Source: Krishi Gyan Manjusha, 6th Edition, UP Agriculture Department

4.1.6 Potato

CIBRC registered 17 pesticides for potato. The recommendations for potato made by NHB and in the states of Uttar Pradesh, Bihar and Punjab were compared with the pesticides registered by CIBRC

National Horticulture Board

NHB recommended 18 pesticides for potato, of which 12 pesticides were not registered by CIBRC (Table 4.21).

Table 4.21 Recommendation of Pesticides for Potato by NHB

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
27	**18**	**21**	**12**
2,4-D, Aureofungin, Captan, Carbofuran, Carboxin, Chlorothalonil, Copper Sulphate, Cymoxanil, Dimethoate, Dimethomorph, Endosulfan*, Famoxadone, Hexaconazole, Kitazin, Mancozeb, MEMC, Metalaxyl, Oxydemeton – methyl, Oxyflourfon, Paraquat dichloride, Phorate, Streptomycin , Tetracycline, Thiamethoxam, Thiram, Zineb, Ziram	Carbofuran, Copper Sulphate, Dimethoate, Mancozeb, Metalaxyl, Phorate, Chlorpyrifos, Dicofol, Quinalphos, Monocrotophos, Thiabendazole, Hydroxyquinoline, Zinc Sulphate, Carbendazim, Boric Acid, Copper Oxychloride, Flucholralin, Pendimethalin	2,4-D, Aureofungin, Captan, Carboxin, Chlorothalonil, Cymoxanil, Dimethomorph, Endosulfan*, Famoxadone, Hexaconazole, Kitazin, MEMC, Oxydemeton – methyl, Oxyflourfon, Paraquat dichloride, Streptomycin, Tetracycline, Thiamethoxam, Thiram, Zineb, Ziram	Chlorpyrifos, Dicofol, Quinalphos, Monocrotophos, Thiabendazole, Hydroxyquinoline, Zinc Sulphate, Carbendazim, Boric Acid, Copper Oxychloride, Flucholralin, Pendimethalin

Source: National Horticultural Board website (http://nhb.gov.in/bulletin-vegetables.html)

Uttar Pradesh

The agriculture department of Uttar Pradesh recommended seven pesticides for cpotato, of which two pesticides were not registered by CIBRC (Table 4.22).

Table 4.22 Recommendation of Pesticides for Potato in Uttar Pradesh

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
27	**7**	**22**	**2**
2,4-D,Aureofungin,Captan, Carbofuran, Carboxin,Chlorothalonil,Copper Sulphate, Cymoxanil, Dimethoate,Dimethomorph, Endosulfan*,Famoxadone, Hexaconazole, Kitazin, Mancozeb,MEMC, Metalaxyl, Oxydemeton – methyl,Oxyflourfon,Paraquat dichloride,Phorate, Streptomycin, Tetracycline, Thiamethoxam,Thiram, Zineb,Ziram	Dimethoate, Mancozeb, Organomurcural compounds, Metalaxyl, Oxydemeton methyl, Monocrotophos, Boric acid	2,4-D, Aureofungin, Captan, Carbofuran, Carboxin, Chlorothalonil, Copper Sulphate, Cymoxanil, Dimethomorph, Endosulfan*, Famoxadone, Hexaconazole, Kitazin, Oxyflourfon, Paraquat dichloride, Phorate, Streptomycin, Tetracycline, Thiamethoxam, Thiram, Zineb, Ziram	Monocrotophos, Boric acid

Source: Krishi Gyan Manjusha, 6th Edition, UP Agriculture Department

Bihar

The agriculture department of Bihar recommended six pesticides for potato, of which, two pesticides were not registered by CIBRC (Table 4.23).

Table 4.23 Recommendation of Pesticides for Potato in Bihar

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
27	**6**	**23**	**2**
2,4-D, Aureofungin, Captan, Carbofuran, Carboxin, Chlorothalonil,Copper Sulphate, Cymoxanil,Dimethoate,Dimethomorph, Endosulfan*,Famoxadone, Hexaconazole, Kitazin, Mancozeb, MEMC, Metalaxyl, Oxydemeton – methyl,Oxyflourfon,Paraquat dichloride,Phorate, Streptomycin, Tetracycline, Thiamethoxam,Thiram, Zineb,Ziram	Mancozeb, MEMC, Oxydemeton-methyl, Phorate, Copper Oxychloride, Glyphosate	2,4-D, Aureofungin, Captan, Carbofuran, Carboxin, Chlorothalonil, Copper Sulphate, Cymoxanil, Dimethoate, Dimethomorph, Endosulfan*, Famoxadone, Hexaconazole, Kitazin, Metalxyl, Oxyflourfon, Paraquat dichloride, Streptomycin, Tetracycline, Thiamethoxam, Thiram, Zineb, Ziram	Copper Oxychloride, Glyphosate

Source: Udyan Sandesh-2, Bihar Agriculture Department

Punjab

Punajab Agriculture University recommended 13 pesticides for potato, of which five pesticides were not registered by CIBRC (Table 4.24).

Table 4.24 Recommendation of Pesticides for Potato in Punjab

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
27	**13**	**29**	**5**
2,4-D, Aureofungin, Captan, Carbofuran, Carboxin,Chlorothalonil,Copper Sulphate, Cymoxanil, Dimethoate,Dimethomorph, E ndosulfan*,Famoxadone, Hexaconazole, Kitazin,Mancozeb,MEMC, Metalaxyl, Oxydemeton – methyl,Oxyflourfon, Paraquat dichloride,Phorate, Streptomycin, Tetracycline, Thiamethoxam,Thiram, Zineb, Ziram	Chlorothalonil, Cymoxanil, Dimethoate, MEMC, Mancozeb, Oxydemeton methyl, Paraquate Dichloride, Phorate, Copper oxychloride, Isoproturon, Atrazin, Pendimethalin, Metribuzin	2,4-D, Aureofungin, Captan, Carbofuran, Carboxin, Copper Sulphate, Dimethomorph, Endosulfan*, Famoxadone, Hexaconazole, Kitazin, Metalxyl, Oxyflourfon, Streptomycin, Tetracycline, Thiamethoxam, Thiram, Zineb, Ziram	Copper Oxychloride, Isoproturon, Atrazin, Pendimethalin, Metribuzin

Source: Punjab Agriculture University recommendations for monthly work, 2011

4.1.7 Black pepper

CIBRC registered only two pesticides for black pepper. The recommendations for black pepper made by the Spices Board of India, Indian Instittue of Spices Research, and in the state of Andhra Pradesh were comapared with the pesticides recommended by CIBRC.

Spices Board of India

The Spices Board of India recommended eight pesticides for black pepper and none of them were registered by CIBRC (Table 4.25).

Table 4.25 Recommendation of Pesticides for black pepper by Spices Board of India

Pesticides registered for crop by CIBRC	Pesticides recommended by Spices Board of India for crop	Pesticides registered by CIBRC but not recommended by Spices Board of India	Pesticides recommended by Spices Board of India but not registered by CIBRC
2	**8**	**2**	**8**
Metalxyl, Mancozeb	Copper oxychloride, Copper Sulphate, Carbofuran, Chlorpyrifos, Dimethoate, Endosulfan*, Phorate, Quinalphos,	Metalxyl, Mancozeb	Copper oxychloride, Copper Sulphate, Carbofuran, Chlorpyrifos, Dimethoate, Endosulfan*, Phorate, Quinalphos,

Source: Spices Board of India Website (www.indianspices.com/html/spices_spfarm_blkpepper.html)

Indian Institute of Spices Research

Indian Institute of Spices Research recommended 10 pesticides for black pepper and eight of them were not registered by CIBRC (Table 4.26).

Table 4.26 Recommendation of Pesticides for black pepper by Indian Institute of Spices Research

Pesticides registered for crop by CIBRC	Pesticides recommended by Indian Institute of Spices Research for crop	Pesticides registered by CIBRC but not recommended by Indian Institute of Spices Research	Pesticides recommended by Indian Institute of Spices Research but not registered by CIBRC
2	**10**		**8**
Metalxyl, Mancozeb	Metalaxyl, Mancozeb, Carbendazim, Copper oxychloride, Copper Sulphate, Potassium Phosphonate, Quinalphos, Dimethoate, Phorate, Carbofuran		Carbendazim, Copper oxychloride, Copper Sulphate, Potassium Phosphonate, Quinalphos, Dimethoate, Phorate, Carbofuran

Source: Package of Practices for Black pepper, Indian Institute of Spices Research

Andhra Pradesh

Andhra Pradesh Horticulture University recommended 10 pesticides for black pepper and eight of them were not registered by CIBRC (Table 4.27).

Table 4.27 Recommendation of Pesticides for black pepper in Andhra Pradesh

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
2	**10**	**0**	**8**
Metalxyl, Mancozeb	Metalaxyl, Mancozeb, Copper oxychloride, Copper Sulphate, Potassium Phosphonate, Phorate, Quinalphos, Dimethoate, Monocrotophos, Carbofuran		Copper oxychloride, Copper Sulphate, Potassium Phosphonate, Phorate, Quinalphos, Dimethoate, Monocrotophos, Carbofuran

Source: Package of Practices of the Important Horticultural Crops of Andhra Pradesh, 2010, Andhra Pradesh Horticultural University

4.1.8 Cardamom

CIBRC registered five pesticides for cardamom. The recommendations for cardamom made by the Spices Board of India, Indian Institute of Spices Research and in the state of Tamil Nadu were compared with the pesticides registered by CIBRC.

Spices Board of India

Spices Board of India registered 20 pesticides for cardamom, of which, 17 were not registered by CIBRC (Table 4.28)

Table 4.28 Recommendation of Pesticides for cardamom by Spices Board of India

Pesticides registered for crop by CIBRC	Pesticides recommended by Spices Board of India for crop	Pesticides registered by CIBRC but not recommended by Spices Board of India	Pesticides recommended by Spices Board of India but not registered by CIBRC
5	**20**	**2**	**17**
Diafenthiuron, Fosetyl, Monocrotophos, Phenthoate, Quinalphos	Monocrotophos, Phenthoate, Quinalphos, Chlorpyrifos, Carbofuran, Zinc sulphate, Triton, Sulphur, Phosalone, Profenophos, Acephate, Phenthoate, Methyl parathion, Mancozeb, Formaldehyde, Copper Oxychloride, Aluminium tris (o-ethyl phosphonate), Carbendazim, Potassium Phosphonate, Hexaconazole	Fosetyl, Diafenthiuron	Chlorpyrifos, Carbofuran, Zinc sulphate, Triton, Sulphur, Phosalone, Profenophos, Acephate, Phenthoate, Methyl parathion, Mancozeb, Formaldehyde, Copper Oxychloride, Aluminium tris (o-ethyl phosphonate), Carbendazim, Potassium Phosphonate, Hexaconazole

Source: Spices Board of India website (http://www.indianspices.com/html/spices_spfarm_cardlr.htm)

Indian Institute of Spices research

Indian Institute of Spices Research recommended 16 pesticides for cardamom and 15 of them were not registered by CIBRC (Table 4.29).

Table 4.29 Recommendation of Pesticides for cardamom by Indian Institute of Spices Research

Pesticides registered for crop by CIBRC	Pesticides recommended by Indian Institute if Spices Research crop	Pesticides registered by CIBRC but not recommended by Indian Institute of Spices Research	Pesticides recommended by Indian Institute of Spices Research but not registered by CIBRC
5	**16**	**4**	**15**
Diafenthiuron, Fosetyl, Monocrotophos, Phenthoate, Quinalphos	Quinalphos, Fenthion, Phosalone, Dimethoate, Methyl Demeton, Chlorpyrifos, Dicofol, Sulphur, Captafol, Carbendazim, Mancozeb, Copper oxychloride, Carbofuran, Methyl Bromide, Ethelene-di-bromide, Paraquate dichloride	Diafenthiuron, Fosetyl, Monocrotophos, Phenthoate	Fenthion, Phosalone, Dimethoate, Methyl Demeton, Chlorpyrifos, Dicofol, Sulphur, Captafol, Carbendazim, Mancozeb, Copper oxychloride, Carbofuran, Methyl Bromide, Ethelene-di-bromide, Paraquate Dichloride

Source: Cultivation Practices for Cardamom, Indian Institute of Spices Research

Tamil Nadu

Tamil Nadu Agricultural University recommended 11 pesticides for cardamom and 10 of them were not registered by CIBRC (Table 4.30).

Table 4.30 Recommendation of Pesticides for cardamom in Tamil Nadu

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
5	**11**	**4**	**10**
Diafenthiuron, Fosetyl, Monocrotophos, Phenthoate, Quinalphos	Monocrotophos, Phosalone, Dicofol, Dimethoate, Methyl Demeton, Mancozeb, Copper oxychloride, Carbofuran, Methyl Bromide, Ethelene-di-bromide, Lindane	Diafenthiuron, Fosetyl, Quinalphos, Phenthoate	Phosalone, Dicofol, Dimethoate, Methyl Demeton, Mancozeb, Copper oxychloride, Carbofuran, Methyl Bromide, Ethylene-di-bromide,Lindane

Source: Tamil Nadu Agricultural University Agritech Portal (http://agritech.tnau.ac.in/horticulture/horti_spice%20crops_cardamom.html)

4.1.9 Tea

CIBRC registered 28 pesticides for Tea. The recommendations for tea made in the states of Assam and Tamil Nadu and by the Tea Reasearch Station in Tocklai (Assam) were compared with the pesticides registered by CIBRC.

Assam

The Assam Agriculture University recommended eight pesticides for tea and three of them were not registered (Table 4.31).

Table 4.31 Recommendation of Pesticides for Tea in Assam

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
28	**8**	**23**	**3**
Azadirachtin, Bitertanol, Carbofuran, Copper Hydroxide, Deltamethrin, Dicofol, Endosulfan*, Ethion, Fenazaquin, Fenpropathrin, Fenpyroximate, Flufenzine, Glyphosate, Gulfosinate Ammonium, Hexythiazox, Metaldehyde, Oxyflourfon, Paraquat dichloride , Phosalone, Profenofos, Propargite, Propiconazole, Quinalphos, Spiromesifen, Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiamethoxam	Carbofuran, Dicofol, Endosulfan*, Glyphosate, Paraquat dichloride, Malathion, Dalapon, Copper oxycloride	Azadirachtin, Bitertanol, Copper Hydroxide, Deltamethrin, Ethion, Fenazaquin, Fenpropathrin, Fenpyroximate, Flufenzine, Gulfosinate Ammonium, Hexythiazox, Metaldehyde, Oxyflourfon, Phosalone, Profenofos, Propargite, Propiconazole, Quinalphos, Spiromesifen, Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiamethoxam	Malathion, Dalapon, Copper oxychloride

Source: Package of Practices for Rabi Crops, 2009, Assam Agriculture University, Jorhat

Tamil Nadu

The Tamil Nadu Agriculture University recommended eight pesticides for tea and five of them were not registered by CIBRC (Table 4.32).

Table 4.32 Recommendation of Pesticides for Tea in Tamil Nadu

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
28	**11**	**22**	**5**
Azadirachtin, Bitertanol, Carbofuran, Copper Hydroxide, Deltamethrin, Dicofol, Endosulfan*, Ethion, Fenazaquin, Fenpropathrin, Fenpyroximate, Flufenzine, Glyphosate, Gulfosinate Ammonium, Hexythiazox, Metaldehyde, Oxyflourfon, Paraquat dichloride , Phosalone, Profenofos, Propargite, Propiconazole, Quinalphos, Spiromesifen, Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiamethoxam	Dicofol, Endosulfan*, Phosalone, Propiconazole, Quinalphos, Sulphur, Carbaryl, Chlorpyriphos, Copper oxycloride, Hexaconazole, Nickel chloride	Azadirachtin, Bitertanol, Carbofuran, Copper Hydroxide, Deltamethrin, Ethion, Fenazaquin, Fenpropathrin, Fenpyroximate, Flufenzine, Glyphosate, Gulfosinate Ammonium, Hexythiazox, Metaldehyde, Oxyflourfon, Paraquat dichloride, Profenofos, Propargite, Spiromesifen, Streptomycin Sulphate, Tetracylin Hydrocloride, Thiamethoxam	Carbaryl, Chlorpyrifos, Copper oxycloride, Hexaconazole, Nickel chloride

Source: Tamil Nadu Agricultural University Agritech Portal (http://agritech.tnau.ac.in/horticulture/horti_plantation%20crops_tea.html)

Tea Research Station Tocklai (Assam)

The Tea Research Station recommended 15 pesticides for tea and 10 of them were not registered by CIBRC (Table 4.33).

Table 4.33 Recommendation of Pesticides for Tea by Tea Research Station, Tocklai

Pesticides registered for crop by CIBRC	Pesticides recommended by Tea Research Station for crop	Pesticides registered by CIBRC but not recommended by Tea Research Station	Pesticides recommended by Tea Research Station but not registered by CIBRC
28	**15**	**23**	**10**
Azadirachtin, Bitertanol, Carbofuran, Copper Hydroxide, Deltamethrin, Dicofol, Endosulfan*, Ethion, Fenazaquin, Fenpropathrin, Fenpyroximate, Flufenzine, Glyphosate, Gulfosinate Ammonium, Hexythiazox, Metaldehyde, Oxyflourfon, Paraquat dichloride , Phosalone, Profenofos, Propargite, Propiconazole, Quinalphos, Spiromesifen, Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiamethoxam	Azadirachtin, Dicofol, Quinalphos, Sulphur, Acephate, Cartap hydrochloride, Chlorpyrifos, Cypermethrin, Dimethoate, Etofenprox, Fenitrothion, Fenvalerate, Fluvalinate, Formothion, Thiometon	Bitertanol, Carbofuran, Copper Hydroxide, Deltamethrin, Endosulfan*, Ethion, Fenazaquin, Fenpropathrin, Fenpyroximate, Flufenzine, Glyphosate, Gulfosinate Ammonium, Hexythiazox, Metaldehyde, Oxyflourfon, Paraquat dichloride, Phosalon, Propiconazol, Profenofos, Propargite, Spiromesifen, Streptomycin Sulphate, Tetracylin Hydrocloride, Thiamethoxam	Acephate, Cartap hydrochloride, Chlorpyrifos, Cypermethrin, Dimethoate, Etofenprox, Fenitrothion, Fenvalerate, Fluvalinate, Formothion, Thiometon

Source: Tea Research Station website (http://www.tocklai.net/)

4.1.10 Sugarcane

CIBRC registered 18 pesticides for sugarcane. The recommendations made for sugarcane in the states of Uttar Pradesh, Maharashtra and Tamil Nadu and by the Sugarcane Breeding Institute, Coimbatore were compared with the pesticides registered by CIBRC.

Uttar Pradesh

The State Agriculture Department of Uttar Pradesh recommended 16 pesticides for sugarcane, of which, five were not registered by CIBRC (Table 4.34).

Table 4.34 Recommendation of Pesticides for Sugarcane in Uttar Pradesh

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
18	**16**	**7**	**5**
2,4 D, Atrazine, Bromadiolone, Carbofuran, Chlorantraniliprole, Chlorpyrifos, Cypermethrin, Dichlorvos, Diuron, Fipronil, Hexazinone, Imidacloprid, Lindane, MEMC, Metalaxyl, Monocrotophos, Phorate, Quinalphos	2,4 D, Atrazine, Carbofuran, Chlorpyrifos, Dichlorvos, Fipronil, Imidacloprid, Lindane, Monocrotophos, Phorate, Quinalphos, Carbaryl, Fenvelarate, Dimethoate, Copper Oxychloride, Sulphur	Bromadiolone, Chlorantraniliprole, Cypermethrin, Diuron, Hexazinone, MEMC, Metalaxyl	Carbaryl, Fenvelarate, Dimethoate, Copper Oxychloride, Sulphur

Source: Krishi Gyan Manjusha, 6th Edition, UP Agriculture Department

Maharashtra

Mahatma Phule Krishi Vidyapeeth, Rahuri (Maharashtra) recommended 11 pesticides for sugarcane, of which, four were not registered by CIBRC (Table 4.35).

Table 4.35 Recommendation of Pesticides for Sugarcane in Maharashtra

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
18	**11**	**11**	**4**
2,4 D, Atrazine, Bromadiolone, Carbofuran, Chlorantraniliprole, Chlorpyrifos, Cypermethrin, Dichlorvos, Diuron, Fipronil, Hexazinone, Imidacloprid, Lindane, MEMC, Metalaxyl, Monocrotophos, Phorate, Quinalphos	2,4 D, Atrazine, Carbofuran, Chlorpyrifos, Imidacloprid, Lindane, Monocrotophos, Malathion, Methyl demeton, Dimethoate, Carbendazim	Bromadiolone, Chlorantraniliprole, Cypermethrin, Dichlorvos, Diuron, Fipronil, Hexazinone, MEMC, Metalaxyl, Phorate, Quinalphos	Malathion, Methyl Demeton, Dimethoate, Carbendazim

Source: Krishi Dainandini, Mahatma Phule Krishi Vidyapeeth, Rahuri

Suagrcane Breeding Institute, Coimbatore

The Sugarcane Breeding Institute recommended 14 pesticides for sugarcane, of which, six were not registered by CIBRC (Table 4.36).

Table 4.36 Recommendation of Pesticides for Sugarcane by Sugarcane Breeding Institute

Pesticides registered for crop by CIBRC	Pesticides recommended by Sugarcane Breeding Institute for crop	Pesticides registered by CIBRC but not recommended by Sugarcane Breeding Institute	Pesticides recommended by Sugarcane Breeding Institute but not registered by CIBRC
18	**14**	**10**	**6**
2,4 D, Atrazine, Bromadiolone, Carbofuran, Chlorantraniliprole, Chlorpyrifos, Cypermethrin, Dichlorvos, Diuron, Fipronil, Hexazinone, Imidacloprid, Lindane, MEMC, Metalaxyl, Monocrotophos, Phorate, Quinalphos	2,4 D, Atrazine, Carbofuran, Chlorantraniliprole, Chlorpyrifos, Imidacloprid, Lindane, Monocrotophos, Paraquate dichloride, Glyphosate, Metrabuzin, Isoproturon, Oxyflourfen, Ethoxy sulfuron	Bromadiolone, Cypermethrin, Dichlorvos, Diuron, Fipronil, Hexazinone, MEMC, Metalaxyl, Phorate, Quinalphos	Paraquate dichloride, Glyphosate, Metrabuzin, Isoproturon, Oxyflourfen, Ethoxy sulfuron

Source: Sugarcane cultivation in sub tropical India, 2011, Sugarcane Breeding Institute, Coimbatore

Tamil Nadu

Tamil Nadu Agricultural University recommended 18 pesticides for sugarcane, of which, 12 were not registered by CIBRC (Table 4.37).

Table 4.37 Recommendation of Pesticides for Sugarcane in Tamil Nadu

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
18	**19**	**11**	**12**
2,4 D, Atrazine, Bromadiolone, Carbofuran, Chlorantraniliprole, Chlorpyrifos, Cypermethrin, Dichlorvos, Diuron, Fipronil, Hexazinone, Imidacloprid, Lindane, MEMC, Metalaxyl, Monocrotophos, Phorate, Quinalphos	2,4 D, Atrazine, Carbofuran, Chlorpyrifos, Imidacloprid, Lindane, Monocrotophos, Dimethoate, Methyl Demeton, Malathion, Acephate, Endosulfan*, Oxyflurofen, Grammaxone, Glyphosate, Ammonium Sulphate, Thiobencarb, Carbendazim, Tridemefon	Bromadiolone, Chlorantraniliprole, Cypermethrin, Dichlorvos, Diuron, Fipronil, Hexazinone, MEMC, Metalaxyl, Phorate, Quinalphos	Dimethoate, Methyl Demeton, Malathion, Acephate, Endosulfan*, Oxyflurofen, Grammaxone, Glyphosate, Ammonium Sulphate, Thiobencarb, Carbendazim, Tridemefon

Source: Tamil Nadu Agricultural University Agritech Portal (http://agritech.tnau.ac.in/agriculture/sugarcrops_sugarcane.html)

4.1.11 Cotton

CIBRC registered 63 pesticides for cotton. The recommendations made for cotton by Indian Agricultural Research Institute and in the states of Maharashtra, Punjab and Madhya Pradesh were compared with the pesticides registered by CIBRC.

Indian Agricultural Research Institute (IARI)

IARI recommended 13 pesticides for cotton, of which, three were not registered by CIBRC (Table 4.38).

Table 4.38 Recommendation of Pesticides for Cotton by IARI

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended by IARI but not registered by CIBRC
63	**13**	**53**	**3**
Acephate, Acetamiprid, Alachlor, Azadirachtin, Bacillus thuringiensis, Beauveria bassiana, Bifenthrin, Buprofezin, Carbaryl, Carbendazim, Carbofuran, Carbosulfan, Carboxin , Chlorantraniliprole , Chlorpyrifos, Clothianidin, Cypermethrin, Deltamethrin, Diafenthiuron, Dicofol, Diflubenzuron, Dimethoate, Diuron, Emamectin Benzoate, Endosulfan, Ethion , Fenpropathrin, Fenvalerate, Fipronil, Flubendiamide, Fluchloralin, Fluvalinate, Imidaclopride, Indoxacarb, Lambda-Cyhalothrin, Lufenuron, Malathion, Methomyl , Methyl Parathion, Monocrotophos, Novaluron, NPV of Helicoverpa, Armigera, Oxydemeton – methyl, Paraquat dichloride, Pendimethalin, Permethrin, Phenthoate, Phorate , Phosalone, Profenofos, Pyridalyl, Pyrithiobac Sodium, Quinalphos, Spinosad, Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiacloprid, Thiamethoxam , Thiodicarb, Thiram, Triazophos, Verticillium Lecanii	Chlorpyrifos, Endosulfan, Fluchloralin, Imidacloprid, NPV of Helicoverpa,Armigera, Pendimethalin, Profenofos, Streptomycin Sulphate, Thiamethoxam , Triazophos, Trifluralin, Glyphosate, Copper Oxychloride	Acephate, Acetamiprid, Alachlor, Azadirachtin, Bacillus thuringiensis, Beauveria bassiana, Bifenthrin, Buprofezin, Carbaryl, Carbendazim, Carbofuran, Carbosulfan, Carboxin, Chlorantraniliprole, Clothianidin, Cypermethrin, Deltamethrin, Diafenthiuron, Dicofol, Diflubenzuron, Dimethoate, Diuron, Emamectin Benzoate, Ethion, Fenpropathrin, Fenvalerate, Fipronil, Flubendiamide, Fluvalinate, Indoxacarb, Lambda-Cyhalothrin, Lufenuron, Malathion, Methomyl, Methyl Parathion, Monocrotophos, Novaluron, Oxydemeton – methyl, Paraquat dichloride, Permethrin, Phenthoate, Phorate, Phosalone, Pyridalyl, Pyrithiobac Sodium, Quinalphos, Spinosad, Sulphur, Tetracylin Hydrocloride, Thiacloprid, Thiodicarb, Thiram, Verticillium Lecanii.	Trifluralin, Glyphosate and Copper Oxychloride

Source: Kharif Fasalon ki Kheti, 2012, IARI

Maharashtra

Mahatma Phule Krishi Vidyapeeth, Rahuri recommended four pesticides for cotton, of which, one was not registered by CIBRC (Table 4.39).

Table 4.39 Recommendation of Pesticides for Cotton in Maharashtra

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
63	**4**	**60**	**1**
Acephate, Acetamiprid, Alachlor, Azadirachtin, Bacillus thuringiensis, Beauveria bassiana, Bifenthrin, Buprofezin, Carbaryl, Carbendazim, Carbofuran, Carbosulfan, Carboxin , Chlorantraniliprole , Chlorpyrifos, Clothianidin, Cypermethrin, Deltamethrin, Diafenthiuron, Dicofol, Diflubenzuron, Dimethoate, Diuron, Emamectin Benzoate, Endosulfan, Ethion , Fenpropathrin, Fenvalerate, Fipronil, Flubendiamide, Fluchloralin, Fluvalinate, Imidaclopride, Indoxacarb, Lambda-Cyhalothrin, Lufenuron, Malathion, Methomyl , Methyl Parathion, Monocrotophos, Novaluron, NPV of Helicoverpa armigera, Oxydemeton – methyl, Paraquat dichloride, Pendimethalin, Permethrin , Phenthoate, Phorate , Phosalone, Profenofos, Pyridalyl, Pyrithiobac Sodium, Quinalphos, Spinosad , Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiacloprid, Thiamethoxam , Thiodicarb, Thiram, Triazophos, Verticillium Lecanii	Bifenthrin, Quinalphos, Thiram, Captan	Acephate, Acetamiprid, Alachlor, Azadirachtin, Bacillus thuringiensis, Beauveria bassiana, Buprofezin, Carbaryl, Carbendazim, Carbofuran, Carbosulfan, Carboxin , Chlorantraniliprole , Chlorpyrifos, Clothianidin, Cypermethrin, Deltamethrin, Diafenthiuron, Dicofol, Diflubenzuron, Dimethoate, Diuron, Emamectin Benzoate, Endosulfan, Ethion , Fenpropathrin, Fenvalerate, Fipronil, Flubendiamide, Fluchloralin, Fluvalinate, Imidaclopride, Indoxacarb, Lambda-Cyhalothrin, Lufenuron, Malathion, Methomyl , Methyl Parathion, Monocrotophos, Novaluron, NPV of Helicoverpa armigera, Oxydemeton – methyl, Paraquat dichloride, Pendimethalin, Permethrin , Phenthoate, Phorate , Phosalone, Profenofos, Pyridalyl, Pyrithiobac Sodium, Spinosad , Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiacloprid, Thiamethoxam , Thiodicarb, Triazophos, Verticillium Lecanii	Captan

Source: Krishi Dainanadini, Mahatma Phule Krishi Vidyapeeth, Rahuri

Punjab

Punjab Agricultural University recommended 30 pesticides for cotton, of which, seven were not registered by CIBRC (Table 4.40).

Table 4.40 Recommendation of Pesticides for Cotton in Punjab

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
63	**30**	**40**	**7**
Acephate, Acetamiprid, Alachlor, Azadirachtin, Bacillus thuringiensis, Beauveria bassiana, Bifenthrin, Buprofezin, Carbaryl, Carbendazim, Carbofuran, Carbosulfan, Carboxin , Chlorantraniliprole , Chlorpyrifos, Clothianidin, Cypermethrin, Deltamethrin, Diafenthiuron, Dicofol, Diflubenzuron, Dimethoate, Diuron, Emamectin Benzoate, Endosulfan, Ethion , Fenpropathrin, Fenvalerate, Fipronil, Flubendiamide, Fluchloralin, Fluvalinate, Imidaclopride, Indoxacarb, Lambda-Cyhalothrin, Lufenuron, Malathion, Methomyl , Methyl Parathion, Monocrotophos, Novaluron, NPV of Helicoverpa, Armigera, Oxydemeton – methyl, Paraquat dichloride, Pendimethalin, Permethrin , Phenthoate, Phorate , Phosalone, Profenofos, Pyridalyl, Pyrithiobac Sodium, Quinalphos, Spinosad , Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiacloprid, Thiamethoxam , Thiodicarb, Thiram, Triazophos, Verticillium Lecanii	Acephate, Buprofezin, Carbaryl, Chlorantraniliprole, Chlorpyrifos, Cypermethrin, Deltamethrin, Endosulfan, Ethion, Flubendiamide, Imidaclopride, Indoxacarb, Novaluron, Paraquat dichloride, Pendimethalin, Profenofos, Pyridalyl, Quinalphos, Spinosad, Streptomycin Sulphate, Thiamethoxam, Thiodicarb, Triazophos, Trifluralin, Alphamethrin, Cyfluthrin, 2, 4 –D, Copper Oxychloride, Captan, Glyphosate	Acetamiprid, Alachlor, Azadirachtin, Bacillus thuringiensis, Beauveria bassiana, Bifenthrin, Carbendazim, Carbofuran, Carbosulfan, Carboxin, Clothianidin, Diafenthiuron, Dicofol, Diflubenzuron, Dimethoate, Diuron, Emamectin Benzoate, Fenpropathrin, Fenvalerate, Fipronil, Fluchloralin, Fluvalinate, Lambda-Cyhalothrin, Lufenuron, Malathion, Methomyl, Methyl Parathion, Monocrotophos, Oxydemeton – methyl, Permethrin, Phenthoate, Phorate, Phosalone, Pyrithiobac Sodium, Sulphur, Tetracylin Hydrocloride, Thiacloprid, Thiram, Verticillium Lecanii	Trifluralin, Alphamethrin, Cyfluthrin, 2, 4 –D, Copper Oxychloride, Captan, Glyphosate

Source: Punjab Agriculture University recommendations for monthly work, 2011

Madhya Pradesh

Madhya Pradesh Agriculture Department recommended 32 pesticides for cotton, of which, four were not registered by CIBRC (Table 4.41).

Table 4.41 Recommendation of Pesticides for Cotton in Madhya Pradesh

Pesticides registered for crop by CIBRC	Pesticides recommended in the state for crop	Pesticides registered by CIBRC but not recommended in the state	Pesticides recommended in the state but not registered by CIBRC
63	**32**	**35**	**4**
Acephate, Acetamiprid, Alachlor, Azadirachtin, Bacillus thuringiensis, Beauveria bassiana, Bifenthrin, Buprofezin, Carbaryl, Carbendazim, Carbofuran, Carbosulfan, Carboxin , Chlorantraniliprole , Chlorpyrifos, Clothianidin, Cypermethrin, Deltamethrin, Diafenthiuron, Dicofol, Diflubenzuron, Dimethoate, Diuron, Emamectin Benzoate, Endosulfan, Ethion , Fenpropathrin, Fenvalerate, Fipronil, Flubendiamide, Fluchloralin, Fluvalinate, Imidaclopride, Indoxacarb, Lambda-Cyhalothrin, Lufenuron, Malathion, Methomyl , Methyl Parathion, Monocrotophos, Novaluron, NPV of Helicoverpa, Armigera, Oxydemeton – methyl, Paraquat dichloride, Pendimethalin, Permethrin , Phenthoate, Phorate , Phosalone, Profenofos, Pyridalyl, Pyrithiobac Sodium, Quinalphos, Spinosad , Streptomycin Sulphate, Sulphur, Tetracylin Hydrocloride, Thiacloprid, Thiamethoxam , Thiodicarb, Thiram, Triazophos, Verticillium Lecanii	Acephate, Alachlor, Carbaryl, Carbendazim, Carbosulfan , Chlorpyrifos, Deltamethrin, Diafenthiuron, Dicofol, Dimethoate, Diuron, Endosulfan, Ethion , Fenpropathrin, Fenvalerate, Fluchloralin, Imidaclopride, Malathion, Methyl Parathion, Monocrotophos, Oxydemeton – methyl, Pendimethalin, Phosalone, Quinalphos, Sulphur, Tetracylin Hydrocloride, Thiamethoxam, Triazophos, Dichlorvos, Mancozeb, Copper Oxychloride, Benomyl	Acetamiprid, Azadirachtin, Bacillus thuringiensis, Beauveria bassiana, Bifenthrin, Buprofezin, Carbofuran, Carboxin, Chlorantraniliprole, Clothianidin, Cypermethrin, Diflubenzuron, Emamectin Benzoate, Fipronil,Flubendiamide, Fluvalinate, Indoxacarb, Lambda-Cyhalothrin, Lufenuron, Methomyl, Novaluron, Oxydemeton – methyl, Paraquat Dichloride, Permethrin, Phenthoate, Phorate, Profenofos, Prridalyl, Pyrithiobac Sodium, Spinosad, Streptomycin Sulphate, Thiacloprid, Thiram, Thiodicarb, Verticillium Lecanii	Dichlorvos, Mancozeb, Copper oxychloride and Benomyl

Source: Madhya Pradesh Agriculture Department website (http://www.mpkrishi.org/)

4.2 Analysis

It is quite evident that the crops for which the CIBRC has registered pesticides, have been ignored by other recommending bodies. The recommendations of almost all agriculture departments, universitities and boards considered exceeded the pesticides that CIBRC has been registered for a crop (Table 4.1)

The differences in the registration of CIBRC and recommendations by other bodies have multiple level impacts. A crop is not supposed to contain residues of a pesticide, which is not registered for it. Otherwise, it will be considered adulterated. If the pesticides recommended by the state and other bodies are different from the CIBRC registration then the crops produced will be considered adulterated despite farmers following the recommendations of state or a particular board.

Table 4 .42. Number of Pesticides registered and recommended for common crops

	Registered by CIBRC	Recommended in state/ by board	Registered but not recommended	Recommended but not registered
WHEAT				
Punjab	38	40	9	11
Haryana	38	31	12	5
Uttar Pradesh	38	23	17	2
Madhya Pradesh	38	29	18	9
PADDY				
Uttar Pradesh	78	40	46	8
Tamil Nadu	78	30	56	8
Punjab	78	22	62	6
Bihar	78	13	66	1
APPLE				
NHB	34	19	23	8
Himachal Pradesh	34	7	33	6
Jammu and Kashmir	34	6	30	2
Tamil Nadu	34	5	31	2
MANGO				
NHB	18	16	11	9
Maharashtra	18	21	11	15
Tamil Nadu	18	17	12	11
Uttar Pradesh	18	12	14	8
CAULIFLOWER				
NHB	14	7	13	6
Bihar	14	8	12	6
Andhra Pradesh	14	13	10	9
Uttar Pradesh	14	6	9	1
POTATO				
NHB	27	18	21	12
Uttar Pradesh	27	7	22	2
Bihar	27	6	23	2
Punjab	27	13	29	5
BLACK PEPPER				
Spices Board of India	2	8	2	8
Indian Institute of Spices Research	2	10		8
Andhra Pradesh	2	10	0	8
CARDAMOM				
Spices Board of India	5	20	2	17
Indian Institute of Spices Research	5	16	4	15
Tamil Nadu	5	11	4	10
TEA				
Assam	28	8	23	3
Tamil Nadu	28	11	22	5
Tea Research Station	28	15	23	10
SUGARCANE				
Uttar Pradesh	18	16	7	5
Maharashtra	18	11	11	4
Sugarcane Breeding Institute	18	14	10	6
Tamil Nadu	18	19	11	12
COTTON				
IARI	63	13	53	3
Maharashtra	63	4	60	1
Punjab	63	30	40	7
Madhya Pradesh	63	32	35	4

5. Waiting Periods

A pesticide remains in soil, water and plant for some time after its application and before it breaks down. In India, it has been made mandatory by CIBRC for any new formulation of pesticide to provide data on its persistence in soil, water and crop. The waiting periods should be determined accordingly so that a minimum amount of pesticide is left in environment as well as the food chain. The waiting period should be unique for a combination of pesticide, the active ingredient concentration in its formulation, crop and the target which may be an insect, a disease or a weed. The CIBRC has made recommendations of waiting periods for some of such combinations.

An analysis of ten pesticides which included Phorate, Mancozeb, Methyl parathion, Cypermethrin, Carbendazim, Monocrotophos, Malathion, Quinalphos, Acephate and Triazophos showed that the recommendations of waiting periods were incomplete. The waiting periods of only two pesticides Acephate and Triazophos were complete for all the combinations. No waiting periods were recommended for Methyl parathion, Malathion and Monocrotophos (Fig 5.1).

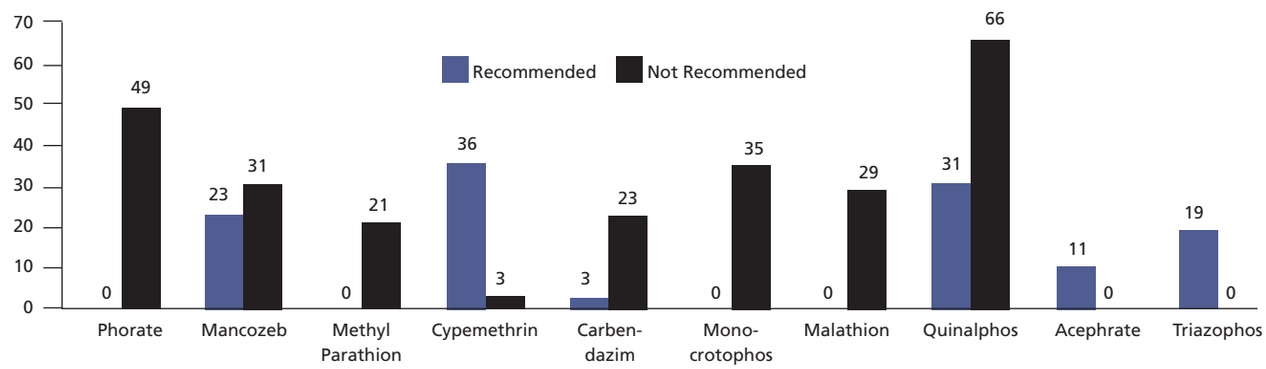
Case Study

Methyl Parathion has been registered for two different concentrations of active ingredient as shown in the table (Table 5.1). For each concentration it has been prescribed for combinations of crops and pests. For all such combinations, waiting periods should be prescribed. In this case no waiting periods have been prescribed.

Table 5.1 Waiting Periods for Methyl Parathion

Active Ingredient	Insect	Waiting Period
Methyl Parathion 2% DP		
Paddy	Ear Head Catterpillar	
	Leaf roller	
	Ear head bug	
Cotton	Aphid	
	Leaf hopper	
	Thrips	
Blach gram	Pod borer	
Green gram	Pod borer	
Soybean	Leaf miner	
Mustard, Groundnut	Sawfly	
	Aphid	
	Leaf miner	
Methyl Parathion 50% EC		
Paddy	Gall midge	
	Green leaf hopper	
	Hipsa	
	Leaf roller	
	Stem borer	
	Whorl maggaot	
Cotton	Aphid	
	Leaf hopper	
	Thrips	

Fig. 5.1. Recommendation of Waiting Periods of various pesticides



Status of JPC Recommendation

JPC had desired the waiting periods of all pesticides for all their uses to be recommended according to the data on their persistence. However, the same has not been done for majority of the pesticides as it is evident from the analysis.

6. Actual Practices

Farmers, pesticide dealers and activists in the states of Madhya Pradesh, Karnataka, Punjab, Bihar, Orissa, Uttar Pradesh, Gujarat, Tamil Nadu and Maharashtra were consulted to understand the agricultural practices being followed. A total of 18 people from all these states were consulted. They were asked about the pesticides being used, recommendations being followed and their understanding about the pesticides' regulations in India.

It was found that most of the farmers were unaware about the recommendations of CIBRC. Only two people were of opinion that recommendations of state agricultural universities/departments were reaching the famers. Most of the farmers either used the pesticides according to their conventional understanding or as the dealers instructed them. Dealers, in most of the cases, knew about the recommendations of state agricultural universities/departments and in few cases, about the CIBRC recommendations. However, they preferred to ignore the same in many cases. They quoted delay in update of the recommendations by state authorities as a problem. The state authorities do not update the recommendations with new pesticides coming in market. Therefore, the dealers preferred to recommend new products on their own. At least two of the respondents also confirmed of Endosulfan* still being used and restrictions on pesticides like Monocrotophos not being followed.

Status of JPC Recommendations

The recommendation of JPC included aggressive campaign for educating farmers and promoting bio-pesticides and organic farming. The survey conducted revealed that farmers are hardly aware about the recommendations. They follow the instructions of the dealers or use what they are given by them. They, in most of the cases, do not even know about the pesticides they are using. They rarely know about the bio-pesticides, though some farmers claimed using Neem based pesticides.

7. Experts' Explanations

Professors and Scientists in various Agricultural Universities and Institutes were contacted for there views on the issue. Five professors were contacted who had different backgrounds like Agriculture, Entomology, Agricultural Chemicals and Extension education. Some of them recognized that such variations in the recommendations were problematic. However, they could not put a very convincing reason behind it. The only reason they cited for lack of unifomity was local needs of agriculture.

8. Action taken on JPC Recommendations

A Joint Parliamentary Committee is formed when one house adopts motion for it and it is supported by the other house. The committee consists of members from Lok Sabha and Rajya Sabha. The members from Lok Sabha are double in number than members from Rajya Sabha. The committee after investigation submits its report in the parliament. The Parliament takes the decision about adopting or rejecting the report partially or fully.

The recommendations of the fourth JPC on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and Other Beverages were mostly accepted by the government. The Action Taken Report filed by Ministry of Health and Family Welfare shows that most of the recommendations made for pesticide regulations were noted by concerned ministries. However, review of current state of pesticide regulations in India showed that the recommendations of JPC have not been implemented properly.

The Action Taken Report on the recommendations of the Joint Parliamentary Committee (JPC) on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juices and Other Beverages was submitted by the Ministry of Health and Family Welfare in 2005. The actions taken on the recommendations of JPC on pesticide regulations in India are as follows:

- On the issue of phasing out organochlorine pesticides, the Ministry of Agriculture (MoA) replied that use of organochlorine pesticides had already been banned for agricultural purposes. Only DDT was allowed for use in public health programmes.
  Status: The organochlorin pesticides listed as persistent organic pollutants (POPs) in Annex A of Stockholm convention have been banned for agricultural use in India.
- The ministry of health and family welfare (MoHFW) noted the recommendations of JPC about setting MRLs for the pesticides for which they were not set despite data being available. The ministry also noted the recommendation to call for the data on other pesticides for which MRLs were not set.
  Status: No decision has been taken on the MRLs of deemed registered pesticides. Overall, MRLs of 59 pesticides registered with CIBRC are not set.
- The MoA noted the recommendation about discontinuing the practice of registering pesticides without setting MRLs and assured change in regulations it ensure it.
  Status: There is no system yet in place to ensure setting of MRLs before registration of pesticides.
- The MoHFW noted the committee's desire to review the existing MRLs for their compliance with acceptable daily intakes (ADI).
  Status: MRLs of many pesticides are still not in compliance with their ADIs.
- Committee found that the waiting periods of deemed registered pesticides were not mentioned on the leaflets due to non availability of residue data. The committee desired the waiting periods to be completed for all pesticides and farmers to be informed about it. The MoA noted the recommendations and informed that waiting periods have to be mentioned mandatorily on all approved leaflets. They also claimed that farmers were being educated about pesticide uses through farmer field schools (FFSs).
  Status: Waiting periods for various uses have still not been recommended by CIBRC. The farmers were

found unaware about recommendations for pesticides.

- The committee noted that no ministry had any data on use of banned pesticides. It desired that both MoA and MoHFW should take steps to ensure the bans and restrictions on pesticides were being followed. It also desired that the farmers to be educated properly about the bans and restrictions on pesticide uses. MoA noted the recommendations and explained that it had already started educating farmers through FFSs. A national level programme for monitoring pesticide residues was being formulated.
  Status: National level monitoring of pesticide residues was started in 2005-06 but the infrastructure for testing pesticide residues is yet not sound enough. The results have been showing that most of the samples are within the set standards which are in contrast to results by other surveys. Farmers were found to be unaware about pesticide regulations and recommendations.
- MoA noted the committee's recommendation about strict punishment provisions for selling banned/restricted pesticides. It had requested the legislative department to amend the Insecticides Act, 1968 for suitable provisions.
  Status: There is no system in place to track the sale of banned pesticides.

9. Conclusions

The recommendations made for pesticides in India are unsatisfactory at multiple levels. There is lack of uniformity in the recommendations made by the Central Insecticide Board and other institutions. Therefore, it is difficult to either set the MRLs of a pesticide for appropriate food commodities or to monitor pesticide residues. The MRLs which have been set are in many cases very high and lead to TMDIs exceeding ADIs. The practices being followed by the farmers are not according to the recommendations. Farmers are mostly unaware of the technicalities of the pesticides and follow the instructions of the pesticide dealers. The dealers were, in few cases, aware of the CIBRC recommendations but in most cases ignored it.

The State Agricultural Universities do not consider the recommendations of CIBRC while recommending pesticides. They have their own research mechanism that they follow. This leads to the difference between recommendations and makes it difficult to monitor the pesticides residues in crops.

The recommendations made by the Joint Parliamentary Committee have not been completely followed. The MRLs of many chemical pesticides have not been set. The recommendations included setting of MRLs for all pesticides for the crops they were registered for. However, the MRLs set do not cover the range of recommendations made for pesticides. MRLs of the pesticides for which TMDI exceeded ADI had to be revised. But the MRLs have not been revised and they are yet very high for a number of pesticides. Consequently, TMDIs exceed the ADI very frequently.

The MRLs need to be completed for all pesticides and for all crops the pesticides have been recommended for. The MRLs for some commodities like fruits and vegetables need to be revised and brought down to a level at which the TMDIs do not exceed ADIs.

10. References

1 http://cibrc.nic.in/cibrc.htm
2 http://cibrc.nic.in/registration_committee.htm
3 http://www.fssai.gov.in/AboutFSSAI/introduction.aspx
4 http://www.fao.org/prods/gap/
5 Requirements for Good Agricultural Practices – IndiaGAP. Bureau of Indian Standards, 2010.
6 ec.europa.eu/food/plant/protection/resources/intro_en.pdf
7 Dietary Guidelines for Indians- National Institute of Nutrition, 2010.
8 Household Consumption of Various Goods and Services in India-National Sample Survey Office, 2012.
9 Food Safety and Standards (Contaminants, Toxins And Residues) Regulations, 2011.
10 Guidelines for predicting dietary intake of pesticide residues. Programme of Food Safety and Food Aid, World Health Organization, 1997.
11 Food As Toxin. Centre for Science and Environment, New Delhi, 2012.

Annexures

Annexure 1a:
Reply of CIBRC to queries about pesticides under RTI Act

S.No.	Points Raised	Reply
1.	Please provide the total number and details of pesticides/insecticides being used in India.	229 pesticides have been registered under the Insecticides Act, 1968 for use in the country. The list is at www.cibrc.nic.in
2.	Please provide the total number and details of pesticides whose tolerance limits have been notified under the Prevention of Food Adulteration Act.	Fixation of Tolerance limits of pesticides is being done under Prevention of Food Adulteration Act, 1954 being implemented through Ministry of Health & Family Welfare.
3.	Please provide the total number and details of pesticides whose tolerance limits are yet to be fixed. Please give details of the stage in which these pesticides are in fixing of the tolerance limit.	
4.	It is true that 27 pesticides do not require tolerance limits. If yes, give the details of such pesticides. If no, please give the exact number and details of such pesticides that do not require a tolerance limit.	No, there are 39 pesticides for which MRL is not required. List is at **Annexure – A**. These are pesticides which are being used for conrol of household insects , pests like mosquito, housefly, cockroach, bedbugs etc. in houses and pesticides used for control of public health pests as such these are not used in agricultural crops. Further bio-pesticides including plant originated pesticides as well as microbial which do not leave residue on the crop are also exempted.
5.	Please explain why the pesticides (in point 4) do not require a tolerance limit.	
6.	Please give details of how many pesticides are registered without a tolerance limit.	There are 10 pesticides for which no tolerance limit is fixed
7.	Place explain the process of fixing tolerance limits for the pesticides that are registered in India.	For fixation of MRL, the information/data is provided in a prescribed performa submitted by the applicant along with application for registration of pesticide which has the details on toxicity, residue and chemistry aspects. On the basis of data/information MRL is fixed by Ministry of Health & Family Welfare.
8.	Please provide details (names and total number) of pesticides that have their tolerance limit based on the CODEX norms	No such information is available in the Directorate.

9.	Please provide details (names and numbers) of pesticides that are being reviewed by the agriculture ministry.	There are 3 pesticides namely Ethion, Chlorphenapyr and Sulfosulfuron which are reviewed presently by Ministry of Agriculture while 65 pesticides have already been reviewed by Ministry of Agriculture through various technical committees. List is at **Annexure – B.**
10.	Please provide details of the numbers and names of pesticides that have been registered without fixing the maximum residue limit or the tolerance limit.	Registration Committee was registering the pesticides after through scrutiny of the data on chemistry, toxicity, bioefficacy and packaging to ensure efficacy and safety of the product at the same time; the information/data was submitted for fixation of MRL to Ministry of Health & Family Welfare. Before August, 2004 afterwards, as per the direction of DAC, on the recommendation of Joint Parliamentary Committee, no pesticides have been registered without fixation of MRL. As on today , there are only 10 pesticide, for which MRL has not been fixed such as Aureofungin, Copper Hydroxide , Copper Sulphate, Cuprous Oxide, Flufenoxuron, Oxycarboxin, Propanil, Sirmate, Streptomycin + Tetracyclin, Thiobencarb

S.No	Points Raised	Reply
1.a.	Please provide us with the updated list of all registered pesticides in India;	229 pesticides have been registered under the Insecticides Act, 1968 for use in the country. The list is at www.cibrc.nic.in.
1.b.	Please also provide us with the list of crops and the pests for which the updated list of pesticides have been registered in India.	The pesticide wise information is availbale on www.cibrc.nic.in under the Head Major Uses of Pesticides .
2.a.	Please provide details of list of pesticides which have been reviewed by the Central Insecticides Board in the last 5 years for their environmental and health impacts and efficacy.	There are 3 pesticides namely Ethion, Chlorphnepyr and Sulfosulfuron which are reviewed presently by Ministry of Agriculture while 65 pesticides have already been reviewed by Ministry of Agriculture through various technical committees. List is at **Annexure – B.**
2.b.	Please provide details of reviews by the Central Insecticides Board in the last 5 years for their environmental and health impacts and efficacy.	
3.a.	Please provide an updated list of pesticides that have been banned by the Central Insecticides Board.	The list is available on the website www.cibrc.nic.in.
3.b.	Please provide details of how the ministry of agriculture is ensuring that pesticides banned in India by the Central Insecticides Board or not being manufactured and sold.	Ministry of Agriculture is issuing Gazette Notification for banning of pesticides for providing the information to all concerned. As per provisions of Insecticides Act, 1968 license for manufactrue and sale of pesticides are issued by State Governments, the licensing authority for only registered pesticides approved for use in the country. Further this information is available on www.cibrc.nic.in.
3.c.	Please provide details /list of the cases filed and action taken against individuals and organizations which have been found selling and manufacturing the banned pesticides.	No such information is available in the Directorate.
4.a.	Please provide an updated list of pesticides allowed for restricted use in India and also provide the use that they have been restricted to.	The list is available on the website www.cibrc.nic.in.
4.b.	Please provide details of how the ministry of agriculture is ensuring that pesticides recommended for restricted use like DDT (allowed only for health	Each label/leafelts contains the information about the use of insecticides including restricted use. At the same time, such

	purposes) and Monocrotophos (not allowed in vegetables) are only used for what they have been restricted to use.	information is desiminated through trainings to farmers through extension workers of State Department of Agriculture as well as Central Government, Ministry of Agriculture.
5.a.	Please provide details of studies done on the health and environmental impacts and efficacy of the pesticide/insecticide IMIDACLOPRID.	Being third party information, consent is required from the registrant.
5.b.	Please provide the lists of companies that producing the insecticide IMIDACLOPRID.	The 9(3) registrant of Imidacloprid is M/s Bayer CropSciences, Mumbai. The list of other 9(4) registrants available after computerisation is available at our website www.cibrc.nic.in. -Application Status – Application Status 9(4) category.
5.c.	Please provide details of health and ecological impacts on efficacy of pesticide/insecticide IMIDACLOPRID.	Being third party information, consent is required from the registrant.

LIST OF PESTICIDES REGISTERED FOR USE IN THE COUNTRY UNDER SECTION 9(3) FOR WHICH NO MRL IS REQUIRED

S. No.	Name of the Pesticide
1)	*Allethrin (HH) (I)
2)	Azadirachtin **(neem products)** (I)
3)	*Bacillus thuringiensis* **(B.t.)** (I)
4)	*Bacillus sphaericus* **(B.s.)** (I)
5)	*Barium carbonate (I)
6)	Bendiocarb (I)
7)	Beauveria bassiana *(I)*
8)	Bifenazate (I)
9)	Bromadiolone (I)
10)	*Carboxin (F)
11)	Chlorpyrifos methyl (I)
12)	Coumachlor (I)
13)	Coumatetralyl (I)
14)	Cyfluthrin (I)
15)	Cyphenothrin (I)
16)	Dazomet (I)
17)	*Dichloropropene and dichloropropane mixture **(DD mixture)** (I)
18)	d-trans allethrin (I)
19)	*Ethylene dichloride and carbon tetrachloride mixture **(EDCT mixture 3 : 1)** (I)
20)	*Gibberellic acid (PGR)
21)	Imiprothrin (I)
22)	*Lime sulphur (F)

23)	Magnesium Phosphide Plates (I)
24)	*Metaldehyde (I)
25)	*Methoxy ethyl mercury chloride **(MEMC)** (F)
26)	Milbemectin (I)
27)	NPV of *H. armigera* (I)
28)	NPV of *S. litura (I)*
29)	Prallethrin (I)
30)	Propetamphos (I)
31)	*Propoxur (I)
32)	s-bioallethrin (I)
33)	*Sulphur (F)
34)	Temephos (I)
35)	*Thiram (F)
36)	Transfluthrin (I)
37)	Trichoderma viridae *(F)*
38)	*Tricontanol (PGR)*
39)	Verticillium lecanii (I)

* Deemed Registered Pesticides (DRPs)

F – Fungicide **I** – Insecticide **H** - Herbicide **PGR** – Plant Growth Regulator **HH** – House Hold **F** - Fixed

Annexure 1b:
Minutes of FSSAI meetings on pesticide residues

FSSAI Scientific Panel on Pesticides and Antibiotic Residues under the Food Authority			
Date	12th October, 2011	**Time**	11.00 AM
Venue	Conference Room, FSSAI, New Delhi	**Meeting**	5th meeting
Attendees	**Members:** Dr. Debabrata Kanungo, Dr. K.K Sharma, Mrs. Mohini Srivastava, Dr. S.K Handa, Dr. Gurudayal Singh Toteja, Dr. B. Surendra Nath, Dr. A.G Appu Rao, Dr. Kiran Narayan Bhilegaonkar, Dr. V. Sudershan Rao. **FSSAI:** Sh. S.B Dongre, Dr. Dhir Singh, Dr. J.P Dongare **Regret:** Dr. Jai Raj Behari, Dr. Tapan Chakrabarti		

Sl.No.	Agenda	Conclusion
1.	**Welcome by the Chairperson and Disclosure of Interest by panel members**	The Chairperson welcomed the members of the panel. Members present declared/ filed their Declaration of Commitment, Annual Declaration of Interest, Specific Declaration of Interest and Declaration involving Confidentiality. Duly signed Declarations in the prescribed format were taken.
2.	**Confirmation of Minutes of the Fourth Meeting of the Panel.**	• It was pointed out by the panel members that the MRL for Deltamethrin in chillies, which was initially fixed as 0.04 mg/kg body weight can be changed to 0.05 mg per kg body weight, in the light of CODEX norms. Accordingly, the table related to TMDI should be modified. • With these modifications, the minutes of fourth meeting were approved.
Consideration of the Agenda		
3 (b) (i)	**Format for submission of pesticide data taking into account the present format being adopted by M/O Agriculture**	• It was decided that the applicant will submit the required information in the modified format along with all the data in CD also. The format for toxicological study will be provided by the chairperson of the panel. The finalised format along with all the changes/modifications will be placed in next meeting, thereafter same will be communicated to RC&CIB.
3(b) (ii)	**Brief on scientific basis for standard body weight to be taken into account for fixation of MRLs of pesticides.**	• The panel discussed about the modalities of calculation of theoretical TMDI, which was presented by Dr. S.K Handa. It was observed that a lot of improvement is required to be achieved in this regard. Thus a further deliberation is required. In this regard, a base paper and a power point

		• It was stated that whether the concept of 50 kg BW can be changed without any scientific justification/study. • The chairperson suggested that a copy of the EFSA study be sent to NIN, Hyderabad, to formulate some age versus weight data, and to start a study on food consumption pattern, since NIN has been conducting similar kind of studies and collecting data from very past. • According to CP, presently JMPR FAO group is using OECD calculator for calculating the MRL using the residue studies.This calculator is easy and flawless.CP informed that the soft ware of this calculator shall be circulated to all the members so that same can be discussed in the next meeting.
c.	**Status Paper on Veterinary Drug Residues**	• A power point presentation was made before the panel members, regarding the MRL for antibiotic residues in milk. • The pathways and sources for contamination of milk were discussed. • Also, problems associated with antibiotic residue in milk in dairy industry and on human health were discussed. • An integrated system for detection of antibiotic, sulpha drugs and inhibitors in raw and treated milk was also discussed. • It was suggested that Dr. Bilegaonkar and Dr. B. Surendra Nath to attempt a mathematical model/format for veterinary drug residue in animals for risk assessment using the toxico dynamic data and metabolism studies etc.
4	**Reviewing the pesticides under "Deemed Registration Category" for fixing MRLs**	• It was mentioned that in 2004, after a JPC, great momentum was given to the registration of pesticides. • The 71 pesticides have to be segregated which have data and which don't have any data, and out of these, the pesticides which are banned in India should be removed. • It was mentioned that only 6 pesticides have their data, with MRLs fixed in 2004. A suitable process for fixing the MRLs should be discussed as the panel is committed to provide the data for these 71 pesticides to the Supreme Court of India.
5.	**Fixing MRLs for antibiotics in honey**	• Dr. G. S Toteja presented a power point presentation before the panel, titled "Presence of Antibiotics/Antibiotic Residue in Honey Sample (Study Protocol)" • It was mentioned in India, Exports Inspection Council has fixed some MRLs for honey, along with certain other nations such as European Union, Canada, Australia and Belgium. • It was also mentioned that the antibiotics detected in honey are Oxy-Tetracycline, Chloramphenicol, Erythromycin, Ampicilline, Enrofloxacin, Ciprofloxacin, Sulphonamides, tetracycline and Quinilones. • According to EIC, Oxy-Tetracycline is detected in highest amount in honey and so the MRL range fixed for it is the highest.

FSSAI Scientific Panel on Pesticides and Antibiotic Residues under the Food Authority			
Date	28th October, 2011	**Time**	11.00 AM
Venue	Conference Room, FSSAI, New Delhi	**Meeting**	6th meeting
Attendees	**Members:**Dr. Debabrata Kanungo, Dr. K.K Sharma, Dr. Tapan Chakrabarti, Mrs. Mohini Srivastava,Dr. S.K Handa,Dr. Gurudayal Singh Toteja, Dr. B. Surendra Nath **FSSAI:** Sh. S.B Dongre, Dr. Dhir Singh, Sh. S.C Kathuria, Sh. Arun Kumar **Regret:**Dr. Kiran Narayan Bhilegaonkar, Dr. Jai Raj Behari, Dr. A.G Appu Rao, Dr. Tapan Chakrabarti		

Sl.No.	Agenda	Conclusion
1.	**Welcome by the Chairperson and Disclosure of Interest by panel members**	The Chairperson welcomed the members of the panel, and started the discussion. Members present declared/ filed their Declaration of Commitment, Annual Declaration of Interest, Specific Declaration of Interest and Declaration involving Confidentiality. Duly signed Declarations in the prescribed format were taken.
2	**Confirmation of Minutes of the fifth meeting of the panel**	The panel added the following points to the minutes of fifth meeting- • The panel discussed about the modalities of calculation of Theoretical Maximum Daily Intake (TMDI). It was observed that a lot of improvement is required to be achieved in this regard. Thus a further deliberation is required. In this regard, a base paper and a power point presentation will be prepared by the chairperson of the panel, Dr. Kaunugo. • The OECD Calculator was demonstrated and was decided to put into operation for fixation of MRL henceforth. • Also, the panel opined that the minutes of the meeting should incorporate the key points of the discussion and not the whole of the discussion.
Consideration of the Agenda		
3	**Fixing of MRLs for antibiotics in Honey.**	• The subcommittee presented the draft of the minutes of the meeting held at IARI, New Delhi on 24th October,2011. • The subcommittee proposed a list of antibiotics to be checked by laboratories for their presence in honey, based on the studies done by organisations like EIC, Dabur, Centre of Science and Environment, Tamil Nadu Agricultural University and Food and Drug Administration, Mumbai.

Annexure 2
Draft notifications on MRLs of pesticides

MINISTRY OF HEALTH AND FAMILY WELFARE

(Department of Health and Family Welfare)

NOTIFICATION

New Delhi, the 20th April, 2009

G.S.R. 261(E).— The following draft of certain rules further to amend the Prevention of Food Adulteration Rules, 1955, which the Central Government, after consultation with the Central Committee for Food Standards, proposes to make in exercise of the power conferred by sub-section (1) and sub-section (1A) of section 23 of the Prevention of Food Adulteration Act, 1954 (37 of 1954) , is hereby published as required by sub-section (1) of section 23 of the said Act, for the information of all persons likely to be affected thereby, and notice is hereby given that the said draft rules will be taken into consideration after the expiry of a period of sixty days from the date on which the copies of the Gazette of India in which this notification is published, are made available to the public;

The objections and suggestions, which may be received from any person with respect to the said draft rules within the period specified above will be considered by the Central Government;

Objections or suggestions, if any, may be forwarded to the Secretary, Ministry of Health and Family Welfare, Government of India, Nirman Bhavan, New Delhi – 110001.

DRAFT RULES

1. (1) These rules may be called the Prevention of Food Adulteration (4th Amendment) Rules, 2009.

(2) They shall come into force on the date of their final publication in the Official Gazette.

2. In the Prevention of Food Adulteration Rules, 1955, in rule 65, in sub-rule (2), in the Table:-

(a) against serial number 15(c) relating to Gamma (γ) isomer known as Lindane, in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
"Sugarcane	0.1"

;

(b) against serial number 28, relating to Paraquat-Dichloride (Determined as paraquat cations), in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
"Tea	0.05"

;

(c) against serial number 41, relating to Cypermethrin (sum of isomers (fat soluble residue), in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
"Cottonseed oil	0.01"

(d) against serial number 42, relating to Decamethrin/ Deltamethrin, in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
Okra	0.05
Tomato	0.05

(e) against serial number 74, relating to Fenpropathrin, in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
"Brinjal	0.2
Okara	0.5
Chillies	0.2
Tea(green/black)	1.0"

(f) against serial number 76, relating to Hexaconazole, in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
"Mango	0.02
Rice	0.02
Ground nut seed	0.02
Tea(black)	0.02
Grapes	0.1
Chillies	0.5
Potato	0.02
Soybean	0.02"

(g) against serial number 81 , relating to Myclobutanil, in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
"Apple	0.01
Chilli	0.20"

(h) against serial number 96, relating to Lambdacyhalothrin, in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
"Soyabean	0.001
Mango	0.002"

(i) against serial number 106 , relating to Spinosad, in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(j)

(3)	(4)
"Red gram	0.01
Chilli	0.001"

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(k) against serial number 107 , relating to Thiamethoxam, in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
"Okra	0.50
Cotton seed oil	0.01
Brinjal	0.30
Tomato	0.01
Wheat	0.01
Tea Green/Black	0.01
Mango	0.01
Potato	0.01
Mustard Seed	0.01"

;

(l) against serial number 111 , relating to Fenoxy-prop-p-ethyl, in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
"Rice	0.002"

;

(l) against serial number 133, relating to Indoxacarb, in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
"Tomato	0.05
Chillies	0.01
Pigeon pea	0.1"

;

(m) against serial number 135, relating to Lufenuron, in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
"Cauliflower	0.1
Pigeon pea	0.1
Cotton seed	0.01"

;

(n) against serial number 141 relating to Tebuconazole, in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
"Rice	0.05
Green chillies	0.2
Groundnut seed	0.05
Groundnut oil	0.05"

;

(o) against serial number 142 relating to Propineb, in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:-

(3)	(4)
"Tomato	1.0"

;

(p) after serial number 143 relating to Thioclorprid and entries relating thereto, the following serial numbers and entries shall be inserted, namely:-

(1)	(2)	(3)	(4)
"144	Clothianidin	Cotton seed	0.02
		Cotton seed oil	0.02
		Rice	0.02
145	Flusilazole	Apple	0.05
		Grapes	0.05
146	Emamectin Benzoate	Cotton seed	0.02
		Cottonseed oil	0.02
		Okra	0.05
		Groundnut oil	0.05
147	Pyriproxyfen	Cotton Seed	0.02
		Cotton Seed oil	0.02
		Brinjal	0.02
		Okra	0.03
		Chillies green	0.02
		Chillies red	0.02
148	Mesosulfuron Methyl	Wheat	0.01
149	Iodosulfuron Methyl Sodium	Wheat	0.01
150	Milbemectin	Chillies green	0.01
		Chillies red	0.01

151	Carfentrazone Ethyl	Wheat	0.01
152	Azoxystrobin	Grapes	0.5
153	Mepiquat Chloride	Potato	0.1
154	Metalaxyl M	Grapes	0.05
155	Pyrithiolac Sodium	Cotton Seed Oil	0.02
156	Dinocap	Mango	0.1
157	Oxadiargyl	Onion	0.1
		Cumin	0.005
158	Fipronil	Rice	0.001
		Chillies	0.001
		Sugarcane	0.01
		Cabbage	0.001
159	Thifluzamide	Rice	0.05
160	Pyridalyl	Cottonseed oil	0.02
		Cabbage	0.02
		Okra	0.02
161	Pencycuron	Rice	0.01
162	Flumite	Brinjal	0.5
		Tea green/black	0.05
163	Diafenthiuron	Cardamom	0.5
		Brinjal	1.00
		Chillies green	0.05
		Chillies red	0.05
164	Alpha cypermathrin	Cotton Seed oil	0.05".

[F. No. 15014/6/2006-PH(Food)]

DEBASISH PANDA, Jt. Secy.

Note : The Prevention of Food Adulteration Rules, 1955 were published in the Gazette of India, Part II, Section 3, *vide* number S.R.O. 2105, dated the 12th September, 1955 and were last amended *vide* number G.S.R. 754(E), dated 27-10-2008.

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MINISTRY OF HEALTH AND FAMILY WELFARE

(Department of Health and Family Welfare)

NOTIFICATION

New Delhi, the 15th May, 2009

G.S.R. 328(E).—The following draft of certain rules further to amend the Prevention of Food Adulteration Rules, 1955, which the Central Government, after consultation with the Central Committee for Food Standards, proposes to make in exercise of the powers conferred by sub-section (1) and sub-section (1A) of section 23 of the Prevention of Food Adulteration Act, 1954 (37 of 1954) , is hereby published as required by sub-section (1) of section 23 of the said Act, for the information of all persons likely to be affected thereby, and notice is hereby given that the said draft rules will be taken into consideration after the expiry of a period of sixty days from the date on which the copies of this Official Gazette in which this notification is published, are made available to the public;

The objections and suggestions which may be received from any person with respect to the said draft rules within the period specified above will be considered by the Central Government;

Objections or suggestions, if any, may be forwarded to the Secretary, Ministry of Health and Family Welfare, Government of India, Nirman Bhavan, New Delhi – 110001.

DRAFT RULES

1. (1) These rules may be called the Prevention of Food Adulteration (5th Amendment) Rules, 2009.

   (2) They shall come into force on the date of their final publication in the Official Gazette.

2. In the Prevention of Food Adulteration Rules, 1955, in rule 65, in sub-rule (2), in the Table,-

   (a) against serial number 9 relating to Endosulfan, in columns (3) and (4), after the existing entries, the following entries shall respectively be inserted , namely:-

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(f) against serial number 109 relating to Thiodicarb, in columns (3) and (4), after the existing entries, the following entries shall be inserted , namely:-

(3)	(4)
"Chillies	0.01"

;

(g) against serial number 117 relating to Acetamiprid, in columns (3) and (4), after the existing entries, the following entries shall be inserted , namely:-

(3)	(4)
"Chillies	0.01
Rice	0.01"

;

(h) against serial number 118 relating to Cymoxanil, in columns (3) and (4), after the existing entries, the following entries shall be inserted , namely:-

(3)	(4)
"Potato	0.01"

;

(i) against serial number 138, relating to Oxadiargyl, in columns (3) and (4), after the existing entries, the following entries shall be inserted , namely:-

(3)	(4)
"Mustard Seed	0.05"

;

(j) against serial number 143 relating to Thioclorprid, in columns (3) and (4), after the existing entries, the following entries shall be inserted , namely:-

(3)	(4)
"Chillies (green)	0.02
Chillies (Red)	0.02"

;

(k) after serial number 143 and the entries relating thereto, the following serial numbers and entries shall be inserted, namely:-

Sl.No.	Name of Insecticide	Food	Tolerance Limit mg/kg (ppm)
1	2	3	4
"144.	Oxyflluorfen	Tea	0.20
		Potato	0.01
		Onion	0.05
145.	Kasugamycin	Rice	0.05
		Tomato	0.05

146.	Azoxytrobin	Tomato	1.0
		Mango	0.01
		Chilli	1.0
147.	Diafenthiuron	Cotton Seed Oil	1.0
		Cabbage	1.0
148.	Metalaxyl M	Black pepper	0.5
		Mustard Seed	0.01
149.	Bensulfuron Methyl	Rice	0.01
150.	Validamycin	Rice	0.01
151.	Chlorfenopyr	Chilli(green)	0.05
152	Hexythiazox	Tea	0.01
		Chilli (green)	0.01
		Dried Chilli	0.01
153.	Fenamidone	Potato	0.01
		Grapes	0.05
154.	Fenazaquin	Apple	0.2
		Chilli (green)	0.5
155.	Hexazinone	Sugarcane	0.02
156.	Mepiquat Chloride	Cotton Seed	0.5
		Cotton Seed Oil	0.5
157.	Pyraclostrobin	Tomato	0.01
158.	Forchlorfenuron	Grapes	0.01
159.	Quizalofop-p-tefuryl	Soyabean Seed	0.02
160.	Fenpyroximate	Coconut Water	0.02
		Tea(Black)	0.2
161.	Metsulfuron methyl	Rice	0.01
162.	Chlorantraniliprole	Rice	0.03
		Cabbage	0.03
		Sugarcane	0.03
		Cotton	0.03
163.	Famoxadone	Grapes	0.05"

;

[F. No. P. 15014/09/2008-PH (F)]

DEBASISH PANDA, Jt. Secy.

Note : The Prevention of Food Adulteration Rules, 1955 were published in the Gazette of India, Part II, Section 3, vide number S.R.O 2106, dated the 12th September, 1955 and were last amended vide number G.S.R 754(E) dated 27.10.08

PREVENTION OF FOOD ADULTERATION

NOTIFICATION-G.S.R.264(E)

Dated: 30th March 2011

The following draft of certain rules further to amend the Prevention of Food Adulteration Rules, 1955, which the Central Government, after consultation with the Central Committee for Food Standards, proposes to make in exercise of the powers conferred by sub-section (1) read with sub-section (1A) of Section 23 of the Prevention of Food Adulteration Act, 1954 (37 of1954), and in supersession of the notification of the Government of India in the Ministry of Health and Family Welfare (Department of Health and Family Welfare) published in the Gazette of India, *vide* number G.S.R.524(E), dated the 15th July,2008, is hereby published, for the information of all persons likely to be affected thereby, and notice is hereby given that the said draft rules will be taken into consideration after the expiry of a period of thirty days from the date on which the copies of the Gazette of India in which this notification is published, are made available to the public;

The objections and suggestions which may be received from any person with respect to the said draft rules within the specified period above shall be considered by the Central Government;

The objections or suggestions, if any, may be forwarded to the Secretary, Ministry of Health and Family Welfare, Government of India, Nirman Bhawan, New Delhi-110108.

DRAFT RULES

1. (1) These rules may be called the **Prevention of Food Adulteration (2nd Amendment) Rules, 2011.**

(2) They shall come into force on the date of their final publication in the Official Gazette.

2. In the Prevention of Food Adulteration Rules, 1955, in rule 65, in sub-rule (2), in the Table,

(a) against serial number 41, relating to Cypermethrin (sum of isomers fat soluble residue), in columns (3) and (4), after the existing entries, the following entries shall be inserted, namely:

S. No.	Name of Insecticide	Food	Tolerance Limit mg/kg. (ppm)
(1)	(2)	(3)	(4)
		"Rice	0.01"

(b) against serial number 42, relating to Decamethrin/ Deltamethrin, in columns (3) and (4), after the existing entries, the following entries, shall be inserted, namely:

	(3)	(4)
	"Red gram	0.01
	Mango	0.01
	Tea	2.0";

(c) in serial number 46, against item (c) relating to Mancozeb, in columns (3) and (4), after the entries, the following entries, shall be inserted, namely:

	(3)	(4)
	"Cumin	0.5";

(d) against serial number 80, relating to Propiconazol, in columns (3) and (4), after the existing entries, the following entries, shall be inserted, namely:

	(3)	(4)
	"Tea	0.1
	Groundnut seed	0.1
	Rice	0.05
	Soyabeen seed	0.01";

(e) against serial number 93, relating to Chlorimuronethyl, in columns (3) and (4), after the existing entries, the following entries, shall be inserted, namely:

	(3)	(4)
	"Rice	0.002
	Soyabeen Seed	0.002";

(f) against serial number 96, relating to Lambdacyhalothrin, in columns (3) and (4), after the existing entries, the following entries, shall be inserted, namely:

	(3)	(4)
	"Brinjal	0.20
	Tomato	0.10
	Rice	0.01
	Bhindi	2.0
	Red Gram	0.01
	Bengal Gram	0.01
	Chillies Green	0.05

Chillies Red	0.005
Groundnut Seed	0.01
Onion	0.01";

(g) against serial number 107, relating to Thiamethoxam, in columns (3) and (4), after the existing entries, the foll entries, shall be inserted, namely:

(3)	(4)
"Acid lime	0.02";

(h) against serial number 122, relating to Propargite, in columns (3) and (4), after the existing entries, the following er shall be inserted, namely:

(3)	(4)
"Chillies	2.0
Apple	2.0";

(i) after serial number 143, and the entries relating thereto, the following serial numbers and entries, shall be ins namely:

S. No.	Name of Insecticide	Food	Tolerance Limit mg/kg. (ppm)
(1)	(2)	(3)	(4)
"144.	Fipronil	Cotton seed oil	0.005
145.	Cinmethylin	Rice	0.05
146.	Paclobutrazoll	Mango	0.01
147.	Fenpyrozimate	Chilli	1.0
		Tea (green)	2.0
148.	Difenoconazole	Chillies	0.002
		Rice	0.002
149.	Flusilazole	Rice	0.01
		Chillies	0.01
150.	Metalazyl-M	Potato	0.01
151.	Hydrogen Cyanamide	Grapes	0.01
152.	Buprofezin	Cotton Seed oil	0.01
		Chillies	0.01
		Mango	0.01
		Grapes	0.01
153.	Novaluron	Chillies	0.01
		Chickpea	0.01
154.	α -Napthy Acetic Acid	Tomato	0.10
		Chilli	0.2
		Mango	0.05
		Cottonseed oil	0.05
		Grapes	0.05
155.	Methomyl	Tomato	0.05
		Pigeonpea seeds	0.05
		Chilli	0.05
		Groundnuts seed	0.05
		Grapes	0.05
156.	Flubendiamide	Cotton seed oil	0.10
		Rice	0.10
157.	Penconozole	Black gram seed	0.02
		Mango	0.05
		Apple	0.02"

(Arun K.Pa

No.P.15014/26/2007-PH(F)Pt.
Issued by: Ministry of Health and Family Welfare
(Department of Health and Family Welfare) New Delhi

Note :-The Prevention of Food Adulteration Rules, 1955 were published in Part II, Section 3 of the Gazette of India *vide* S.R.O. 21 dated the 12th September, 1955 and were last amended *vide* G.S.R. 652(E), dated the 2nd August, 2010.