

# **Report of the Expert Committee to frame a policy for Monitoring of Pesticide Residues in Fruits & Vegetables**



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## **BACKGROUND:**

A news item titled 'Indian Veggies, fruits remain highly toxic' was published in 'Sunday Times of India' New Delhi Edition dated October 31, 2010, quoting a study, conducted by a Delhi-based NGO Consumer-Voice, on samples collected from various wholesale and retail shops in Delhi, Bangalore and Kolkata, wherein a total of 193 samples of 35 different vegetables were collected and residues of certain banned pesticides viz. Chlordane, Endrin and Heptachlor were reported in bitter gourd and spinach. 79 samples of 17 different fruits were also collected and presence of residues above Maximum Residue Limit (**MRL**), fixed under Prevention of Food Adulteration (**PFA**) Act (now **Food Safety and Standards (FSS) Act, 2006**) was reported in one sample.

Hon'ble High Court of Delhi took cognizance of the study conducted by the said NGO and constituted a 5-membered Committee to collect samples of vegetables and fruits from Agricultural Produce Marketing Committee (**APMC**) and local market. On the direction of the Hon'ble Court, a study was conducted during April 05, 2011 to April 15, 2011 wherein 31 samples of seven different vegetables, namely, tomato, bottle gourd, bitter gourd, brinjal, potato, *parval* and *tinda* were collected by the said Committee from different parts of Delhi and samples were analyzed for possible presence of residues of organo-chlorine, organo-phosphorous, synthetic pyrethroids, herbicides, etc group of pesticides (including banned pesticides reported by the NGO, VOICE) by four NABL accredited laboratories in Delhi. No banned pesticide was detected in any of the vegetable samples tested for residues.

The said Committee also collected the samples of fruits, namely, apple, pear, sweet-lime (*mausambi*) and banana from different parts of Delhi and the same were analyzed for possible presence of residues of organo-chlorine, organo-phosphorous, synthetic pyrethroids, herbicides, etc group of pesticides (including banned pesticides reported by the NGO, VOICE) by four NABL accredited laboratories in Delhi during August 01, 2011 to August 26, 2011. A total of 32 fruit samples from seven different locations of Delhi were analyzed.

Pesticide residues were detected in four fruit samples and none of the samples showed the presence of pesticide residues above MRL notified under PFA Act (now **FSS Act, 2006**), Ministry of Health and Family Welfare (**MoHFW**).

Subsequently, on the directives of the Hon'ble High Court of Delhi, Ministry of Agriculture (MoA), Department of Agriculture & Co-operation (DAC) vide O.M. F. No. 21-1/2010-PP.II (MPRNL) dated June 11, 2012(**Annexure-I**) constituted an Expert Committee to suggest a policy for monitoring of pesticide residues on vegetables and fruits, as under:-

- (i) The number of vegetables and fruits to be tested should be enlarged, i.e. the test should be for all the fruits and vegetables in Delhi;
- (ii) the periodicity of checking should be increased so that there is constant monitoring in this behalf;
- (iii) there should be transparency in respect of flow of information to the public by loading the necessary data arising from such checking on the website and being published in the newspapers so that the public is aware of what it is purchasing and from where;
- (iv) there should be endeavour to have smaller labs in the vicinity of the *mandis* so that an immediate check may be possible as vegetables are being sourced in Delhi from different parts of the country. If, at the threshold, it is detected that a particular consignment is contaminated then a decision can be taken not only qua the consignment, but also the area from where it is being sourced to facilitate the concerned authorities to even take necessary steps in that area;
- (v) methods to be evolved to control the flow of pesticides to farmer community so that at the user stage, only permissible pesticides are used;
- (vi) the test be also carried out for fruits being imported from abroad; and

(vii) remedial measures be suggested for the user public to remove contamination and due publicity be given to the same.

### **ROADMAP FOR DELIBERATIONS**

The Committee had six sittings to deliberate issues:-

- (i) First Sitting : July 26, 2012
- (ii) Second Sitting: August 08, 2012
- (iii) Third Sitting : August 30, 2012
- (iv) Fourth Sitting : September 11, 2012
- (v) Fifth Sitting : September 25, 2012
- (vi) Sixth Sitting : October 01, 2012
- (vii) Seventh Sitting: November 07, 2012
- (viii) Eighth Sitting: May 21, 2013

During the fifth and sixth sittings on September 25, 2012 and October 01, 2012, respectively, the Committee discussed the draft report and finalized its recommendations for submitting to Prof. M.S. Swaminathan for his guidance/inputs. Thereafter, the Committee had two more sittings to deliberate upon the inputs from Prof Swaminathan, consider the submission of Crop Care of India in compliance with the directions of the Hon'ble High Court in March, 2013 and finalize the Report.

In its first meeting, the Committee unanimously opted one of the members, Shri Vipin Bhatnagar, as its Secretary too. Thereafter, the Committee finalized a roadmap for deliberations on each of the Terms of Reference before arriving at just recommendations and submitting its report in minimum possible time by dividing the task under the following captions:-

- (a) Gathering necessary information;
- (b) Statutory regime;
- (c) Deliberation on issues; and
- (d) Finalizing recommendations.

## **GATHERING NECESSARY INFORMATION**

### **A. Pesticide Residues:**

The Committee studied the original news item titled ‘Indian Veggies, fruits remain highly toxic’, published in ‘Sunday Times of India’ New Delhi Edition dated October 31, 2010, wherein the results of the study conducted by a Delhi-based NGO Consumer-Voice on samples of fruits and vegetables, collected from various wholesale and retail shops in Delhi, Bangalore and Kolkata, were published and noted the presence of pesticides, which belonged to Persistent Organic Pollutants (POPs) group and were banned for manufacture and use in agriculture long ago.

The Committee also studied the work conducted under the Department of Agriculture and Cooperation, Ministry of Agriculture sponsored central sector scheme “Monitoring of Pesticide Residues at National Level (MPRNL)” for testing of pesticide residues in food commodities and environmental samples with the participation of 21 laboratories representing Ministry of Agriculture, Indian Council of Agriculture Research, Ministry of Health and Family Welfare, Ministry of Environment and Forest, Council of Scientific and Industrial Research, Ministry of Chemical and Fertilizer, Ministry of Commerce and State Agricultural Universities across the country.

The main objectives of the scheme include:

- To identify crops and regions having preponderance of pesticide residues in order to focus extension efforts for Integrated Pest Management (IPM) and Good Agriculture Practices (GAP).
- To strengthen infrastructure at Quarantine stations to prevent entry of food and food commodities which have pesticide residues above maximum residue limit (MRL).

- Testing / Certification of pesticide residue in export / import consignments.
- To test pesticide residues in food commodities and environmental samples like soil and water.

The results of the study under this Scheme provide a national scenario of presence of pesticide residues in food commodities and are considered useful in ascertaining commonly detected pesticides. The data may be utilized for preparing the technical programme for conducting any new monitoring study. The details of the study conducted during April, 2011 to March, 2012 are given below:

#### **Status of Pesticide Residues in food commodities and environmental samples**

During the period April 2011 to March 2012, samples of vegetable, fruits, spices, cereals, pulses, milk, animal feed, fish/crustacean, tea, honey, meat, egg, soil and ground water were collected and analysed for the possible presence of organo-chlorine, organo-phosphorous, synthetic pyrethroids, carbamates, herbicides etc. groups of pesticide residues. A total of 16,948 samples have been analysed by 21 participating laboratories, out of which 290 (1.7%) samples were found above maximum residue limit (MRL) as prescribed under Prevention of Food Adulteration Act (PFA) / Food Safety Standard Authority of India (FSSAI) of Ministry of Health and Family welfare and CODEX (**Annexure-II**).

#### **Status of Pesticide Residues in vegetable samples**

A total of 6441 vegetable samples of brinjal, okra, tomato, cabbage, capsicum, chilli and cauliflower collected from the various APMC /wholesale / retail markets located at different parts of the country were analysed during April 2011-March 2012 by 17 participating laboratories. In 208 (3.2%) samples, the residues were found above MRL levels. In Delhi, a total of 1120 vegetable samples were collected for APMC markets and retail outlets. The

pesticide residues above MRL were detected in 60 (5.3%) samples. The residues of mostly chlorpyrifos, profenophos, triazophos, imidacloprid, acephate, ethion, phorate, quinalphos and cypermethrin were detected in vegetable samples which include unapproved pesticides.

#### **Status of Pesticide Residues in fruits samples**

A total of 2,170 samples of fruits (apple, banana, grapes, orange, pomegranate, guava and mango) were analyzed by 14 laboratories. Residues were found above MRL were detected in 12 (0.5%) samples. Frequently detected pesticides were of chlorpyrifos, EDBC, cypermethrin, profenophos and lambda-cyhalothrin. Residues of some unapproved pesticides which were commonly detected were quinalphos, profenophos and cypermethrin.

#### **Status of monitoring of Pesticide Residues on fruits and vegetables in NCT, Delhi**

There is only one laboratory in NCT of Delhi for estimation of pesticide residues with 100 samples per month capacity and capable of scanning only 28 pesticides, viz. aldicarb, monocrotophos, phorate,  $\alpha$ -HCH, thiometon, dimethoate,  $\beta$ -HCH, lindane,  $\delta$ -HCH, formothion, methyl parathion, carbaryl, heptachlor, fenitrothion, aldrin, malathion, fenthion, parathion, chlorpyrifos, o,p-DDE,  $\alpha$ -endosulfan, dieldrin, p,p-DDE, o,p-DDD,  $\beta$ -endosulfan, p,p-DDD, ethion and captafol. Samples are collected from vendors and divided into four portions as per the laid down procedure so as to cover appeal and legal angles. The samples are stored in the fridge. On first analysis, if any sample is found to be containing residues above MRL, it is not considered safe and the appeal sample portion is sent to Central Food Technological Research Institute (CFTRI), Mysore. If the results of first analysis are confirmed, legal action is initiated. However, so far, no case of pesticide residues above MRL has been found. During 2011-12, samples of *arbi*, beans (3), beet root, bitter gourd (7), bottle gourd(3), cabbage, capsicum (3), cucumber(2), green peas pod (3), green peas frozen, grapes (3), lady finger (4), *lobia* (pod), potato(6), spinach (2), tomato (5), *torai*(4), apple (13),

banana (3), mango(6) and orange (2) were analysed at State %Grading Laboratory (F&V), Directorate of Agricultural Marketing, GNCTD for presence of above mentioned pesticides with reference to PFA/FSSA and results of all the samples were below the limit of quantification (LOQ).

### **B. Trend of use of pesticides**

The Committee noted the trend of consumption of pesticides at national level and in NCT, Delhi during last five years (**Annexure-III**). As on 27.02.2012, Delhi has 205 Sale Points for pesticides, of which 10 belong to Department of Agriculture; 8 to Co-operatives/Agros; and 187 to Private Traders.

The Committee also noted that total pesticide consumption in India is far less at 0.5 kg per hectare (ha) when compared to Europe at 2.5 kg per ha, Korea at 6.6 kg per ha, USA at 7.0 per ha, Japan at 12 kg per ha and Taiwan 17 kg per ha.

### **C. Arrival of fruits and vegetables in NCT, Delhi**

The Committee noted that the State of Delhi does not have much of agriculture. Therefore, its demand of fruits and vegetables is fulfilled by adjacent as well as far off states, viz. Uttar Pradesh, Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir, Rajasthan, Maharashtra, etc.

Marketing of Agricultural Produce in Delhi is regulated by ‘The Delhi Agricultural Produce Marketing (Regulation) Act, 1998 (Delhi Act No. 7 of 1999)’ and ‘The Delhi Agricultural Produce Marketing (Regulation) General Rules, 2000’. Agricultural Produce Marketing Committee (APMC) was established in the year 1977 with the objective of regulating the marketing of fruits and vegetables, i.e. to ensure orderly marketing of these commodities to safeguard the interests of both producers/sellers and consumers. Principal Market Yard, Ch.



Hira Singh Wholesale Fruit & Vegetable Market, Azadpur has two sub-yards, viz. Okhla Fruit & Vegetable Market and Kela-Siding, Azadpur. The whole of Union Territory of Delhi excluding the area of East of Yamuna River forming Market Area of APMC, Shahdara and also excluding Area from junction point of DayaBasti and SaraiRohilla railway stations along Railway track going to Rohtak upto Delhi/Haryana Border at TikriKalan and from there upto Rewari line Railway track near Bijwasan and then again along Rewari Railway line upto junction point at DayaBasti and SaraiRohilla Railway Stations forming market area of APMC, Keshopur. Basic statistics/information in respect of Azadpur Yard and Okhla Sub-yard is given in **Annexure-IV**; arrivals of last five years (**Annexure- V, Table-1**); arrival of six major commodities (**Annexure-V, Table-2**); and average daily arrival of vehicles (**Annexure-V, Table-3**).

The Committee obtained information on annual arrival of fruits and vegetables in Delhi during last five years. The information was limited to only six commodities as against the number of notified 118 commodities (50 fruits and 68 vegetables). The Committee acquired month-wise arrival of fruits and vegetables for the year 2011-12 in Azadpur Mandi. The information covered nine fruits viz., apple, orange, banana, pomegranate, grapes, guava, mango, pear, sapota, and thirteen vegetables viz., cabbage, cauliflower, okra, brinjal, tomato, capsicum, chillies, palak, peas, cucumber, parwal, *sarson-ka-saag*, *methi* (**Annexure-VI**).

#### **D.Manner of monitoring pesticide residues in fruits and vegetables abroad**

The Committee referred to the Annual Report of Pesticide Residue Committee (U.K.) for the year 2010 for monitoring the pesticide residues, which mentions for sampling strategy as under:-

- (i) Seasonal fruits and vegetables which form part of diet in routine;

- (ii) results of previous monitoring of pesticide residues in fruits & vegetables with respect to approved and unapproved pesticides as well as pesticides, residues of which have been found to be higher than MRLs;
- (iii) the cost, so that value for money is achieved;
- (iv) pesticides to be checked during monitoring; and
- (v) action to be taken on receipt of results.

The Committee also referred to Sampling Strategies and the number of randomly selected primary samples for monitoring of pesticide residues, published by European Food Safety Authority (EFSA) in 2007 Annual Report on Pesticide Residues and the number of randomly selected primary samples for monitoring pesticide residues(**Annexure-VII**).

The Committee also referred to OECD Guidance Document on Crop Field Trials (Version 5, dated 15<sup>th</sup> January, 2011). This document, *inter alia*, discusses principles of crop grouping. According to the document, targeted data sets and data extrapolation are used to provide sufficient data for exposure assessment or for setting MRLs for both individual major and minor crop commodities, and crop commodity groups. Data extrapolation provides the mechanism for extending field trial data from two or three representative crop commodities to related crop commodities in the same crop group or sub-group. Representative crop commodities within the same group should be major in terms of production and consumption and most likely to contain highest residue. Another notable point about it is that the representative commodity should be most likely similar in morphology, growth habit, pest problems and edible portion to the related commodities within a group or sub-group and that GAP should be comparable within the crop group. The document also discusses Codex approach to representative commodities and crop groups.

### **STATUTORY REGIME**

Pesticides are regulated under the following legislations in India:-

1. The Insecticides Act, 1968 and the Rules ,1971;
2. Food Safety and Standards Act, 2006 and Regulations notified thereunder;
3. The Environment (Protection) Act, 1986 and Hazardous Waste (Management & Handling) Rules, 1989;
4. Bureau of Indian Standards Act, 1986;
5. The Factories Act, 1948;
6. Water (Prevention & Control of Pollution) Act, 1974; and
7. Air (Prevention & Control) Act, 1981.

In the present context, two legislations are most relevant, viz. The Insecticides Act, 1968 and the Rules framed thereunder, which are administered by the Ministry of Agriculture, and Food Safety and Standards Act, 2006 and Regulations notified thereunder, which are administered by the Ministry of Health & Family Welfare. The former regulates the use of pesticides while the latter their residues on agricultural commodities. As long as the issue relates to cultivation, it implies crops in the field and the Insecticides Act, 1968 plays its role. No sooner, the harvest of the crops is over, it becomes food and Food Safety and Standards Act, 2006 takes the stage to ensure availability of safe food to the public.

The Preamble of the Insecticides Act, 1968 reads as under:-

***“An Act to regulate the import, manufacture, sale, transport, distribution and use of insecticides with a view to prevent risk to human beings or animals, and for matters connected therewith”.***

The Registration Committee is the executive technical body constituted under section 5 of the said Act to register insecticides (broadly known as pesticides), registers insecticides after satisfying itself regarding their efficacy and safety. The Registration Committee seeks scientifically generated data on 67 broad parameters on Chemistry, Bio-efficacy, Toxicology and Packaging of an insecticide before considering its registration. If the Registration

Committee is not satisfied about the safety and efficacy of a pesticide on examining the data, it may refuse to register the insecticide. So far, 18 pesticides have been refused registration (**Annexure-VIII**).

After the recommendations of the Joint Parliamentary Committee on Pesticides Residues in and Safety Standards for Soft drinks, Fruit Juices and Other Beverages in 2004, no pesticide is registered without fixation of 'Maximum Residue Limit' (MRL) on the crop on which is intended to be used. Earlier, pesticides were registered first and their MRLs were fixed subsequently. The MRLs are fixed as 'Tolerance Limits' under the provisions of the Food Safety and Standards Act, 2006 (formerly, Prevention of Food Adulteration Act, 1954 and Rules 1955) and notified.

Rules 18 (1) (a) of the Insecticides Rules, 1971 requires inclusion of a leaflet in packing of every insecticide containing details of the plant disease, insects and noxious animals or weeds against which the insecticide is to be applied on a particular crop and adequate direction concerning the manner in which the insecticide is to be used including dosage, precautions, pre-harvest interval etc.. The details of approved pesticides and their uses are given on the website:**www.cibrc.nic.in**. This list is dynamic and modified from time to time.

Pesticides are reviewed from time to time by specially constituted Expert Committees for their continuing use, restricting use (**Annexure-IX**) or banning use (**Annexure-X**).

The Preamble of Food Safety and Standards Act, 2006 reads as under:-

***“An Act to consolidate the laws relating to food and to establish the Food Safety and Standards Authority of India for laying down science based standards for articles of food and to regulate their manufacture, storage, distribution, sale and import, to ensure***

*availability of safe and wholesome food for human consumption and for matters connected therewith or incidental thereto”.*

The Act defines “contaminant” as “*any substance, whether or not added to food, but which is present in such food as a result of the production (including operations carried out in crop husbandry, animal husbandry or veterinary medicine), manufacture, processing, preparation, treatment, packing, packaging, transport or holding of such food or as a result of environmental contamination and does not include insect fragments, rodent hairs and other extraneous matter*”.

The rules are being phased into the Food Safety and Standards Regulations, 2010. This Act authorizes the Food Safety and Standards Authority of India (FSSAI) to “specify the limits for use of food additives, crop contaminants, pesticide residues, residues of veterinary drugs, heavy metals, processing aids, mycotoxins, antibiotics and pharmacological active substances and irradiation of food.” (Chapter II). The existing MRLs on pesticides and agrochemicals specified in the Prevention of Food Adulteration Act, 1954 and Rules, 1955 are incorporated in the Food Safety and Standards Regulations, 2010(reference Chapter 8, pages 531-548). MRLs are listed by chemical product for specific food items / commodities.

This Act also defines “Food business” as *any undertaking, whether for profit or not and whether public or private, carrying out any of the activities related to any stage of manufacture, processing, packaging, storage, transportation, distribution of food, import and includes food services, catering services, sale of food or food ingredients*.

There is a provision for registration of transporter either with the respective State Authorities or the Central Authority under the Food Safety and Standards Regulations.

Food Safety and Standards Act, 2006 also defines “Commissioner of Food Safety”, “consumer” “food safety”, “food safety audit” “Food Safety Management System”, “Food Safety Officer”, “Hazard”, “premises”, “risk”, “risk analysis”, “risk assessment”, “risk communication”, “risk management”, “sale”, “sample” and “unsafe food”, which are relevant and have to be implemented by States and/or the Centre to ensure availability of safe food to the public. In case of NCT of Delhi, it would imply “Commissioner of Food Safety” appointed by GNCTD.

The Committee also noted that fruits and vegetables, imported into the country have to pass through Plant Quarantine. A network of such stations is available across the length & breadth of the country at all international points for monitoring exotic insect pests, diseases and weeds on agricultural commodities being imported into the country or meant for export. All consignments have to be accompanied by a phyto-sanitary certificate. The Committee was also informed that a Food Import Clearing System (FICS) is proposed under FSS Act, 2006, which shall be implemented through Customs. FICS is still in the process of finalization.

### **DELIBERATION ON ISSUES**

MRLs /tolerance limits are the levels that can be ingested daily by a human without appreciable risk. MRLs are the concentrations and are food specific. These are set at level at least low enough to ensure that even high –level consumers will not consume more than the ADI (Acceptable Daily Intake) i.e the amount which can be safely ingested daily during the lifetime , if they eat large quantities of every food type containing the residues at the MRL for that food type. The purpose of setting the MRLs at National level is to protect consumer health and to provide a mechanism for enforcing (or measuring/ensuring) compliance with Good Agricultural Practices i. e. authorized uses. MRLs once fixed are not forever. Their re-

evaluation /re-setting may be required if new safety data on pesticide or monitoring data on pesticide residue becomes available.

National Authorities have the responsibility and obligation to ensure that toxic chemical such as pesticide and other contaminants are not present in food at level that may adversely affect the health of consumers. Accordingly, various provisions have been laid down under the Insecticides Act and FSS Act to ensure safety from the presence of pesticide residues which are inevitable on the treated crops. However, perusal of data for 2011-12 gathered under MPRNL Scheme indicates that 3.2% samples of vegetables were above MRL among the total samples collected from all over the country, while this percentage for Delhi was found to be 5.3.

The committee deliberated and decided a roadmap to tackle the problem of pesticide residues and decided to get into the reasons of building up of pesticide residues beyond tolerance limits (MRLs) in the first place, developing a system for monitoring pesticide residues on fruits and vegetables at initial stages, identifying the area of origin of such consignments and taking remedial action there besides strengthening the monitoring mechanism and monitoring pesticides residues regularly in the NCT of Delhi. If the system works, it can be open to other states too for adoption.

Pesticides are toxic by their very nature and, thus, hazardous. Registration of pesticides is mandatory by the person, who intends to import or manufacture them. Pesticides are registered after examination of exhaustive scientific data on their Chemistry, Bio-efficacy, Toxicology and Packaging. India has shifted from use of High Volume, Low Performance pesticides to the use of Low Volume, High Performance pesticides, which are fast degrading under domestic varied agro-climatic conditions. Their metabolism and persistence in soil, water and plant are studied before grant of registration. Their dosage, dilutions, manner of application, target pest on specific crop and waiting period are specified

at the time of approval of registration, i.e. before approval for use. Instructions for use are given on the labels/leaflets in Hindi, English and one or two regional languages to facilitate understanding by the local population, where the pesticide is intended to be used.

Any chemical/substance used during the process of production, development of product tends to leave residues on the treated commodity. Pesticides are no exception. However, if registered pesticides are used judiciously as per GAP, the problem of building up of pesticide residues on crops above MRLs (tolerance limits) should not normally arise. However, findings by several research workers/institutions belie this position, indicating there is something wrong somewhere. Following reasons could be responsible for it:-

- (i) Indiscriminate use;
- (ii) Non-observance of prescribed waiting periods;
- (iii) Use of misbranded pesticides (including spurious pesticides);
- (iv) Continuance of some pesticides restricted for use or banned;
- (v) Use of unapproved pesticides;
- (vi) Contamination by effluents from manufacturing units and disposal of washings after use;
- (vii) Wrong disposal of left over pesticides; and
- (viii) Malpractices and treatment of fruits and vegetables with pesticides.

While deliberating the reasons for presence of pesticide residues of unapproved pesticides on various crops, the Committee noted that Section 38 (1) of the said Act reads as under:-

***“Nothing in this Act shall apply to-***

***(a) the use of any insecticide by any person for his own household purposes or for garden or in respect of any land under his cultivation;***

***(b) any substance specified or included in the Schedule or any preparation containing any one or more such substances, if such substance or preparation is***



*intended for purposes other than preventing, destroying repelling or mitigating any insects, rodents, fungi, weeds and other forms of plant or animal life not useful to human beings.”*

Cl. (a) permits a person to use any pesticide the way one likes on the land under his cultivation and defeats the very purpose of provisions of safety in the legislation, wherein the use is prescribed by the Registration Committee after studying the exhaustive scientific data. The Committee noted that there is a lacuna in the law too, though it is intended to protect the user from any kind of harassment. Even if this provision is removed from the legislation, it would not be practically possible to regulate use of pesticides by all farmers across the country as the cultivation of fruits and vegetables is mostly done by small and marginal farmers except for very few organised sectors. The only way to achieve this objective is to educate the user....and educate repeatedly..... to inculcate and change the habit, highlighting the benefits, which accrue if pesticides are used in the prescribed manner, and harms/, if pesticides are used injudiciously to monitor traceability and identifying the area, produce of which contains higher residues so that corrective steps can be taken accordingly.

Several farmers seek dealer's advice on use of pesticides to overcome a pest problem. Most of the dealers recommend pesticides on which they get more commission in preference to the less lucrative one. There is a strong need to educate dealers. Appropriate training of the dealer should be a pre-requisite to grant of selling license for pesticides.

Further, the Insecticides Act is silent about the 'Advertising'. FAO Code of Conduct provides guidance to the Government to control, by means of legislation, advertising of pesticides in all media to ensure that it is not in conflict with label directions. Such provisions need to be incorporated in the Indian legislation so as farmers are not misguided /lured by inappropriate advertising strategies.

There is another aspect too to this issue. There has been a practice of recommending uses of pesticides by State Agriculture Universities (SAUs) without approval of the Registration Committee, which was mainly responsible for detection of residues of unapproved pesticides on crops. As & when a serious pest problem arises, States look to their respective agriculture university(s) for a solution. A workshop to sensitize the SAUs on this issue was organized by the Ministry of Agriculture, Department of Agriculture & Co-operation at NASC Complex, New Delhi on 30.08.2010. National Institute of Plant Health Management (NIPHM), Hyderabad also organized workshops to sensitize on this issue as a follow up. Similar sensitization is required in all the States. The Committee felt that this practice should immediately stop, if still continuing, as it results in residues of unapproved pesticides on crops. Further, any research carried out by the State Agriculture Universities should be translated into recommendations only after examination of research data by the Registration Committee, fixation of MRLs and consequent approval by the Registration Committee, as required legally.

The Committee deliberated the information on month-wise arrival of fruits and vegetables in NCT of Delhi and felt that information on all notified 118 commodities (50 fruits and 68 vegetables) is required to be compiled by GNCTD, irrespective of the quantity which arrives in *mandis*. Seasonal fruits, viz. apple, banana, grapes, strawberry, pear, peach, plum, mango, chickoo, etc and vegetables, viz. cabbage, cauliflower, leafy vegetables, like, spinach, *Sarson* (Musturd leaves), *Methi* (*Fenugreek* leaves), etc, peas, carrots, *parwal*, beans, cucurbits, brinjal, chilli, *okra*, *capsicum*, etc should also be covered in the compilation because they form major part of the diet of most of the population.

The committee noted that there were peaks and troughs in the figures of arrival depending on the season. The committee felt that the samples of all fruits and vegetables should necessarily be taken during the season while the number of samples of non-seasonal

fruits and vegetables could be less. However, sampling of no fruit or vegetable to be missed round the year and should be covered at least on quarterly basis even if it is non-seasonal. Frequency of sampling and testing could be even more depending on the testing capacity of the authorized laboratories.

The Committee deliberated the issue as to where from the samples should be collected so that they are closest to the representative of the lots arriving for distribution and/or sale. The Committee realized that fruits and vegetables arrive in mandis in big and small lots. Several major producers send their consignments independently while several other small producers pool their produce together and transport collectively to save on cost of transport. However, most of the consignments directly arrive in *mandis*. Vendors also procure vegetables and fruits from *mandis*, therefore, it would be appropriate to collect samples from the base-point, *mandis* and also from vendors for analysis to observe the extent of difference in results of samples drawn from *mandis* and vendors. The outcome of this exercise would facilitate deciding the necessity of sampling from vendors in future. If the results show higher residues in vendors' samples, a strategy therefor shall have to be specially developed. Samples of Fruits and vegetables being sold by vendors on *Yamuna Pushta* or bridges should also be collected.

The Committee deliberated the possibility of using Bar Codes for traceability of consignments for taking corrective action in case residues in a consignment were found to be above MRLs. Possibility of using a Bar Code was initially discussed and considered for adoption also. However, after detailed deliberation, it was not considered feasible. Numbered-vehicles (viz. trucks, tempos, etc.) bring consignments into *mandis* from different areas. Therefore, the samples shall be collected from the consignment at the premises of the *Aadhti* (godown-owner/auctioner). The sample-collection proforma shall have columns for the relevant information, like, name of the *Aadhti*, his shop no., number of the vehicle,

Invoice/Challan No., area from which the vehicle started, name and quantity of the fruit/vegetable, etc. This information would lead to the area of origin of a consignment for intensifying awareness/training programme in case the residues are found to be above MRLs. In this manner, the results of analysis could be correlated to a particular consignment and, thus, to its origin, which in turn would facilitate initiating the remedial action, if needed. Adoption of this methodology would require assistance of APMC and co-operation of *mandio*officials and associations. The whole exercise shall be carried out swiftly, without holding any vehicle or consignment, say, without causing much inconvenience.

Pesticide residues on all consignments of fruits & vegetables, imported into the country could be monitored by stipulating a condition on tolerance limits (MRLs) in the phyto-sanitary certificate, which mandatorily accompany such consignments. On arrival, samples could also be taken from the consignments by Plant Quarantine officers and referred for testing of pesticide residues before releasing them. Once imported fruits and vegetables arrive in the market, their samples can be taken from there and tested for presence of pesticide residues. Further, inspection of fruits and vegetables in cargo-holds or passenger baggage as per declaration by the passenger or search by Customs shall be possible under the FICS system as & when it comes into force. For this purpose, Customs authorities will have to be sensitized as this system is proposed to be implemented through Customs. A care shall have to be taken that samples of fruits and vegetables shall have to be tested expeditiously so as to clear them within 48 to 72 hours as they are perishable. There could be consignments of fruits and vegetables containing such pesticides which are not approved for use in our country and, hence, their MRLs are not fixed. Such consignments shall be liable to be rejected. The Committee felt that pre-dispatch certification of imported vegetables and fruits for pesticide residues by the exporter and testing of their samples on arrival could be possible in a meticulously planned manner.

The committee also discussed the issue of limited infra-structure and capacity of the laboratories to take up the proposed load of work. The annual capacity of the lab of Delhi Government is only 100 samples per month. This is meagre for the State in view of the quantum of fruits and vegetables arrival. It was decided that the existing laboratory of GNCT of Delhi may be sufficiently strengthened in terms of skilled manpower, machinery and material. Besides, establishment of fully equipped 3 to 5 laboratories in different zones may be considered in NCT of Delhi. Alternatively, samples may be tested at NABL accredited private laboratories or FSSAI authorized laboratories and cost of testing may be borne by GNCTD. There are 55 FSSAI authorized laboratories across the country, of which 11 laboratories are located in Delhi/Delhi NCR (**Annexure-XI**). A list of NABL accredited laboratories is placed at Annexure-XII.

The Committee also considered the suggestion that 9 zones (*mandis*) in Delhi could be associated with respective laboratories for monitoring pesticide residues so that a system of testing is set up. After detailed deliberation on the issue, the Committee noted that estimation of pesticide residues in a food commodity is a trace [parts per million (ppm)/parts per billion(ppb)] level analysis. These laboratories are highly sophisticated and required to be located away from the hustle-bustle of a *mandi* in a pollution-free environment. They should have an easy uninterrupted approach. In view of the fact that on receiving the fruits and vegetable samples in the laboratory, the samples have to be extracted and cleaned-up following standard operating procedure and that possible residues of pesticides are estimated on highly sophisticated analytical equipment, like, gas chromatograph (GC), high performance liquid chromatograph (HPLC) and residues are confirmed on Gas chromatograph-mass spectrophotometer (GC-MS) and liquid chromatograph-mass spectrophotometer (LC-MS), where any kind of contamination is prohibited, it was decided that positioning of pesticide residues monitoring laboratories at the gate or in the vicinity of

*mandis* not feasible. Most of the laboratories, Government and private, in Delhi are located near to *mandis* and immediate transportation of samples would not be a problem.

The issue as to how many and which pesticides should be scanned on each commodity was also discussed as scanning of all the pesticides for each sample was neither practical nor essential nor judicious. The Committee was informed that 241 pesticides are already registered for use in the country and this figure increases every year. Therefore, number of pesticides to be scanned should be as per the past experience and also depending on the uses recommended by the State Agriculture Universities (SAUs), which are not approved by the Registration Committee under the Insecticides act, 1968. An indicative list of pesticides commonly used/misused and detected on various commodities may be seen at **Annexure-XIII**. This list shall be dynamic, requiring need-based revision so that the list of pesticides to be scanned can be expanded or reduced depending on the updated information on use of pesticides from time to time.

The Committee unanimously agreed that as & when the technical programme is implemented, it is very important to inform public about the status of contamination of fruits and vegetables with pesticide residues. However, the findings, which are likely to create panic, should be made public only after validation of a representative sample. A group should test such samples so that the results could be counter-verified by inter-laboratory testing before making public. The compilation of results of testing may be published in the prominent Hindi and English newspapers on monthly basis by GNCTD and also displayed on their website, showing the pesticides above MRLs in bold or different colour alongwith the name of *mandi*/area from where the sample was taken so that the public is careful.

Simultaneously, awareness creation programmes for farmers, about safe and judicious use of pesticides may be launched. Ways & means to minimize pesticide residues on fruits and vegetables before use are placed at **Annexure-XIV**. These may be broadcasted through audio-visual media and also displayed on hoardings at prominent public places, like, Bus Stations/Stops, Railway (including Metro) Stations, Hospitals, Cinema Halls, Malls, etc. to simultaneously educate the farmers to use pesticides judiciously and the public to handle such commodities before use. The Committee also felt that *KrishiMelas*, which are frequented by farmers, are the best place to create awareness among them through demonstrations, interaction and displaying/distribution of printed material. Frequencies of *krishimelas* may also be increased, at least to cover two main cropping seasons, viz. Rabi and Kharif.

### **RECOMMENDATIONS**

In view of the foregoing discussion, the Committee makes following recommendations:-

1. The monitoring of pesticide residues on fruits and vegetables sold in Delhi should be intensified in public interest. GNCTD may consider establishing a Pesticide Residue Management Cell (**PRMC**) under the control of Food Commissioner of the State. This Cell shall co-ordinate with other authorities, including APMC, and be responsible for handling all issues related to pesticide residues on food articles.
2. Existing pesticide residues testing infrastructure with GNCTD is required to be strengthened in terms of additional working space, skilled & trained manpower, sophisticated equipment, etc. for smooth and efficient functioning of laboratory. Laboratory capacity is presently under-utilized. Its full potential may be exploited. More laboratories, fully equipped to test pesticide residues along with skilled manpower, may be set up so as to have an analysis capacity of about 300-400

samples per month. Alternatively, testing facilities of some FSSAI authorized laboratories / private NABL accredited laboratories in NCR region may be utilized for testing of about 300-400 fruits and vegetables samples per month.

3. The pesticides commonly used / misused and detected on various commodities are given in **Annexure-XIII** may be incorporated in the list of monitoring pesticides. Since the pesticide usage pattern by the farmers may change due to introduction of newer pesticides, different pest infestations on crops in different seasons, adoption of new crop varieties etc., number of pesticides could be added to or reduced from the list depending on year-to-year experience. This list shall be dynamic and would require need-based revision from time to time.
4. The setting up of pesticide residue laboratory requires huge investment in terms of sophisticated equipments, skilled manpower, building etc. The pesticide residue laboratory is a trace level analysis laboratory and should be located in the dust free, smoke free, pollution free environment. The environmental conditions of the APMC markets / *mandis* does not allow for setting up laboratories in the vicinity of the *mandis*. Further, there is no short cut method for immediate checking of the pesticide residues as it requires proper extraction, clean up and quantification by sophisticated equipment. Therefore, it is not possible to set up small laboratories in the vicinity of the *mandis*. The samples collected from APMC / retail outlets can be quickly transported to the identified laboratories within NCT/NCR, Delhi.
5. A technical work programme may be developed by GNCTD, wherein the number of samples of particular fruits and vegetables may be identified for drawl in proportion to their month-wise arrival in respective mandis and sending to the specified laboratory. All 118 fruits and vegetables (50 fruits and 68 vegetables) should be



covered in the annual work programme. Samples of seasonal fruits and vegetables may be drawn and tested more frequently.

6. Samples shall be drawn as under:-

- (i) In *mandis*, the samples shall be drawn from the consignment at the premises of the *Aadhiti* (godown-owner/auctioneer). The sample-collection proforma (draft at **Annexure- XV**) shall have columns for the relevant information, which shall be filled up from the Challan/Invoice. Adoption of this methodology would require assistance of APMC and co-operation of *mandi* officials and associations. Authorities concerned shall have to issue necessary instructions to them for smooth execution of the programme.
- (ii) Unnumbered transport carriages, viz. hand-carts, rickshaws, etc. However, such samples should be drawn on-the-spot and details of their loading stations shall be recorded on the sample collection proforma;
- (iii) vendors in different *mandi* zones and details of *mandi* from where respective fruits or vegetable item was procured shall also be recorded on the sample collection proforma; and
- (iv) samples may be collected from the retail outlets and local vendors, including *Yamuna Pushta* or various bridges in NCT Delhi and details of source of procurement of respective fruits or vegetable item shall also be recorded on the sample collection proforma.

7. No fruit or vegetable consignment should be allowed to enter into the country without pre-dispatch pesticide testing report by the exporter. Samples of imported fruits and vegetables should be drawn by Plant Quarantine Stations at international

arrival points and monitored for the presence of pesticide residues. The samples of imported fruits and vegetables should also be collected from the retail outlets. It is suggested that the FSSAI, Ministry of Health and Family Welfare and Ministry of Agriculture may draft the guidelines to implement Food Import Clearing System (FICS) in a co-ordinated manner on priority basis soon after its notification.

8. Fair price of every sample taken shall be paid to the person from whom the sample is taken, viz. *aadhati* or the owner of consignment in case of unnumbered transport carriage or vendor or individual seller, etc. against a written acknowledgement so that the exercise does not inflict loss on any person.
9. The results for 3-5 % of tested samples and for those found above MRL, shall be revalidated by retesting the same samples by another identified laboratory before making them public.
10. A statement of results of testing pesticide residues shall be compiled and the particulars of each consignment, including the name of *mandi* or area, as the case may be, alongwith the finding shall be displayed on the website of the Food Department of GNCTD in the event of pesticide residues being above MRLs or of unapproved pesticides. This information shall be displayed on the website of APMC too. This information shall also be made public through print and audio-visual media. The manner of dissemination of information should be such that panic is not created in the minds of the public.
11. Simultaneously, awareness creation programmes for the farmers, including pictorial presentation about harmful effects and judicious use of pesticides, including ‘dos and don’ts’, may be broadcasted through audio-visual media and also be displayed on hoardings at prominent points in the villages. *KrishiMelas*, which are frequented

by farmers, are the best place to create awareness through demonstrations, interaction and displaying/distribution of printed material. Such *KrishiMelas* may be organized from time to time, but not less than twice a year at the start of Rabi and Kharif seasons.

12. Similar awareness programmes on ways & means to minimize pesticide residues on fruits and vegetables may also be made public through audio-visual media and also be displayed on hoardings at different places, like, Bus Stations/Stops, Railway (including Metro) Stations, Hospitals, Cinema Halls, Malls, etc so that public is adequately educated to handle pesticide contaminated commodities. Some of the procedures, which help in removing or minimizing pesticide residues on fruits and vegetables, are given in **Annexure-XIV**.
13. The information on sample collection proforma may be utilized to identify the area of origin of the consignment in the event of pesticide residues being found above MRL in it. PRMC shall approach the Agriculture Department of the concerned State for intensification of extension efforts, viz. stopping indiscriminate use of pesticides, use of unapproved pesticides, etc and ensure judicious use of pesticides, i.e. use of registered pesticides in the dosage and manner prescribed against the target pest of a particular crop and observing the prescribed waiting period, promoting use of environment-friendly bio-pesticides, etc. In this manner, the results of analysis could be correlated to a particular consignment and, thus, to its origin, which in turn would facilitate initiating the remedial action, if needed.
14. In case residues of unapproved pesticides are reported in the consignments originating from a particular area, the State may also be advised to review and align their package of practices with the recommendations of the Registration Committee on use of approved pesticides and ensure that any research carried out by the State Agriculture Universities should be translated into recommendations only after examination of

research data by the Registration Committee, fixation of MRLs and consequent approval by the Registration Committee, as required legally.

15. Efforts to encourage adoption of environment friendly Approach of Plant Protection, Integrated Pest Management, may be made more vigorously.
16. Several farmers seek dealer's advice on use of pesticides to overcome a pest problem. Most of the dealers recommend pesticides on which they get more commission in preference to the less lucrative one. There is a strong need to educate dealers. Appropriate training of the dealer should be a pre-requisite to grant of selling license for pesticides to them.
17. Further, the Insecticides Act is silent about the 'Advertising'. FAO Code of Conduct provides guidance to the Government to control, by means of legislation, advertising of pesticides in all media to ensure that it is not in conflict with label directions. Such provisions need to be incorporated in the Indian legislation so as farmers are not misguided/lured by inappropriate advertisements.
18. Public relations campaign should also be improved. The sensational journalism that flows from the audio-visual media and publication of flaring articles leaves an indelible impression in the minds of the public, which is hard to overcome. Publication of such articles should be permitted only after verification of results of their analysis, supported with chromatograms/spectra, by at least one more laboratory, preferably Government/Government Authorized laboratory.

#### **CONSULTATION WITH PROF. M.S. SWAMINATHAN, MEMBER, RAJYA SABHA**

In compliance with para 5 of the communication of DAC, constituting the Expert Committee (**Annexure-I**), minutes of every meeting were brought to the Notice of Prof. M.S.

Swaminathan, Member (Rajya Sabha) and Draft Report alongwith Recommendations was referred to him for guidance. After perusal of the draft report, Prof. Swaminathan has observed as under:-

**“.....The report reads well. I hope you have given sufficient important to honey since studies by the Centre for Science and Environment reveal the presence of pesticide residues in many samples. You may also like to include CSE as one of the testing laboratories.”**

A copy of the e-mail received from Prof. Swaminathan is placed at **Annexure-XVI**.

The Committee deliberated on the comments, received from Prof Swaminathan and felt that the Terms of Reference limit the intervention of the Committee only to frame a policy on monitoring of pesticide residues on Fruits & Vegetables. As the issues pertaining to monitoring of pesticide residues in honey and inclusion of CSE as one of the testing laboratories fall under the purview of Food Safety & Standards Authority of India (FSSAI), the same may be forwarded to the Authority.

#### **CONSIDERATION OF SUBMISSION OF CROP CARE FEDERATION OF INDIA**

The Committee also considered the submission made by Crop Care Federation of India (CCFI) – **Annexure-XVII** - in view of the directions of Hon’ble High Court of Delhi at New Delhi issued during the hearing in March, 2013. The Committee felt that relevant aspects have already been covered by the Committee in deliberations/recommendations.

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