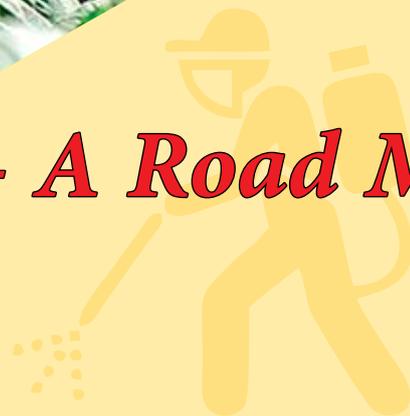




Stakeholders Dialogue on Current Challenges and Way Forward for Pesticides Management



- A Road Map





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Preamble

The use of chemical pesticides has been the best option for farmers for more than 60 years now to combat the existing, emerging and invasive pest problems and to ensure sustainable agriculture and household food and nutrition security in India. In fact, pesticides are medicines for plant health. In view of the environment and food safety issues lately gaining prominence, concern for chemical residues in food and inadvertent soil, water and environmental pollution by pesticides is receiving greater attention. It is, therefore, important that farmers use right kind of pesticides in right way to increase their production while protecting environmental, human, and animal health. It is also well established that pesticides have contributed significantly towards increasing agricultural production and the farmers' income globally. Presently, there are around 1,175 pesticide molecules of both chemical and biological origin being used around the world. In India, presently around 270 molecules are registered for use. Moreover, domestic production has not only enabled India to become self-sufficient but also an important exporter of pesticides. It is also known fact that

research on new pesticide molecules has mostly taken place outside India, mainly due to high cost involved in developing new molecules and relatively low priority accorded to pesticide research in India.

The generic pesticides command about 80 per cent of the market share presently. Of these, the 27 pesticides proposed for ban, constitute almost 25 per cent of total pesticide market in India. These are used for pest control on 74 important food (mainly rice around 29%), fibre (mainly cotton around 19%) and horticultural crops. Some of these are also used against household pests, stored grain pests and in public health programs against vectors of human and animal diseases. Additionally, these are used on certain high value crops including spices, vegetables, fruits, herbs, specialty crops, minor millets, oilseeds, pulses, etc.

Currently, India is the fourth largest producer of pesticides in the world. According to a report by Database Research and Markets, the Indian pesticides market was worth Rs 214 billion in 2019. Pesticides market is further projected to reach a value of Rs 316 billion by 2024, growing at a compound

growth rate (CAGR) of 8.1 per cent annually. India's imports of crop protection chemicals—mainly the technical grade materials or active ingredients that go into making of end-use formulations stood at Rs 9,266.84 crores in 2018-19, most of it coming from USA, EU, Japan, China and Germany. Significantly, India, in 2018-19, exported crop protection chemicals worth Rs 22,092 crores, a large part of it to Brazil (Rs 4314.74 crores) and the USA (Rs 4,238.63 crores). The pesticide industry had a business of about 43,000 crores during 2019-20. Among all pesticides currently used globally in agriculture, herbicides constitute the major proportion (44%) followed by fungicides (27%) and insecticides (22%), whereas in India the major use is of insecticides (44%) followed by herbicides (22%), fungicides (21%) and plant growth regulators (PGR)/biostimulants /seed treatment chemicals (13%). The annual production losses due to pests and diseases in India are estimated at Rs 90,000 crores annually, despite the fact that we use around 60,000 tons of pesticides. In fact, use of pesticide in India is one of the lowest (< 0.5 kg/ha) in the world as compared to other agriculturally important countries like China (13.06 kg/ha), Japan (11.85 kg/ha), Brazil (4.57 kg/ha) and some Latin American countries (FAOSTAT, 2017). Today, China is the largest consumer of pesticides (1.7 mt) in the world, followed by USA (0.4 mt), Brazil (0.37 mt), Argentina (0.2 mt), Canada (0.09 mt) and India (0.06 mt). This obviously reveals that use of pesticides is much lower in India as compared to other agriculturally important countries.

Constraints and Challenges

Non-judicious use of pesticides could pose a potential risk to humans and other life forms and the environment. Often, the farm workers are not protected against exposure to pesticides which leads to serious health issues. The major challenges across the world faced by the pesticide industry and pesticide users are to meet the required environmental regulations. Additionally in India, there are relatively less efforts on research and development (R&D), lack of incentives for innovation such as IPR and data protection, inadequate product diversification, lack of awareness about safe use of pesticides, proliferation of registrations, a relatively fragmented industry, long gestation period for registration of new products and the product quality assurance both at manufacturing and at field level. The additional challenge arises from the use of registered pesticides mainly on 74 high volume crops, and vulnerability of other crops on account of lack of label claims. In order to protect the farmers from sub-standard products, greater attention is needed for post-registration monitoring mechanisms so as to weed out 'fly-by-night' operators, thus ensuring production and use of high quality pesticides only.

Biopesticides constitute only around 3 per cent of pesticide market in the country and so far only 14 biopesticides have been registered over the last two decades. Somehow, the consumption of biopesticides is steadily increasing with growth rate of 7 per cent per annum, which

is a minuscule compared to the need for an arable area of 142 mha. The pace of biopesticides production has remained slow due to lack of farmer awareness, their slow mode of action, challenges of their formulation, storage and shelf life, poor quality and the cost of registration. Also, there is no incentive to the farmers for use of biopesticides. Recent efforts of the Registration Committee to liberalize commercialization of biopesticides by awarding registration to multiple registrants under 9(3), unlike under 9(4), by sharing the data of the original registrant has further discouraged commercialization of diverse eco-specific native strains of biopesticides.

It is also evident that climate change poses the threat of new pest emergence. Continuous use of same pesticides also sometimes leads to building of pest resistance. Hence, a portfolio of chemicals with diverse modes of action is often recommended. In this context, there is an urgent need to register a large number of newer biopesticides. Modern biotechnology has changed the dynamics between chemical pesticides and biotech seeds. Insect tolerance and herbicide tolerance are now built into the seeds using genetically modified (GM) techniques in some of the crops. Also, the use of weedicides has gone up due to shortage and increasing cost of labour. This reiterates the need to register more of new herbicides.

In the recent past, increased globalization and trade liberalization have resulted in spurt of invasive exotic pests. During the last five years, major destructive pests and diseases have invaded Indian agriculture, viz., South American pin worm (2014-15),

TR4 race of Panama wilt (2015-16), coconut spiralling white fly (2015-16), wheat blast like disease (2016-17), maize fall army worm (2018-19) and most recently desert locust (2020) have posed considerable threat to our food security, besides leading to major economic losses. Accordingly, use of pesticides is essentially required to combat new problems arising due to emerging pests, changing pest complex and climate change impact

Banning of Pesticides

The Gazette Notification dated 18 May, 2020 issued by the Government of India, proposing a blanket ban on the use of 27 generic pesticides, has come as a surprise and caused real concerns among the farmers, scientists and the industry. Though only 27 pesticides (8 fungicides, 12 insecticides, 7 herbicides) are proposed to be banned but along with them will go 134 formulations. These pesticides are registered for protection against a wide array of pests and diseases in 74 crops. As such, sudden ban on some commonly used generic pesticides in the absence of suitable alternatives is bound to have negative impact on the production of some major crops.

Conventionally, pesticides are classified based on their toxicity levels. These are marked with red, yellow, blue and green color triangles, red being the most toxic. No doubt, it is desirable to phase out the most toxic pesticides and replace them with safer products in the best interest of farmers and consumers. However, process of banning has to be based on scientific evidence, logic and in a phased manner

rather than to be abrupt. Further, out of 27 pesticides covered under the Gazette Notification, only 3 fall under red triangle category that is the most hazardous.

Moreover, the Central Insecticides Board (CIB) has also approved categorization of pesticides based on toxicity of formulations, which contains technical pesticides, in smaller proportions. Consequently, the toxicities of these formulations, actually handled by the farmers for field use, are liable to be lowered from their red triangle categories to lower levels. Also, there appears to be no justification to impose ban on those pesticides that are included in blue and green category. Further, some of the pesticides included for ban are used in relatively small quantity for treating seeds to protect against seed and soil borne pathogens. Also, the major reasons cited in the draft notification include need for additional data on bioefficacy and toxicity, imposition of their ban in other countries, availability of alternative chemicals, ecotoxicity, etc.

In fact, a pesticide is registered only when it meets all the requirements of bioefficacy, toxicity and the risk to human life, animals and the environment. Further, most of the pesticides are in use for a long time and scientific data on their metabolism, mode of action, activity spectrum, etc. have been generated over time. Thus, apparently there appears no scientific rationale for imposing ban and restricting them from production. Moreover, decisions taken in other countries based on their socioeconomic conditions need not be the basis for imposing blanket ban in our country. On the contrary, their performance under different edapho-climatic conditions, their behaviour,

residues, degradation pattern, and persistence, etc. should be the real basis for any such decision.

Moreover, Codex Alimentarius Commission (CAC) and Codex Committee on Pesticides Resistance (CCPR), constituted by FAO and WHO, undertakes biosafety assessment and approve pesticides, including those possessing endocrine disrupting (ED) properties, through risk based assessment, unlike that insisted by European Union (EU) on hazard basis for pesticides having ED characteristics. The biosafety of pesticides notified for ban and now reported to possess ED properties were registered on risk based assessment, as per internationally agreed principles. Thus, rejecting the once registered pesticides questioning safety assessment principles of Food Safety and Standards Authority of India (FSSAI) will certainly require a review first in consultation with the Ministry of Health and Family Welfare (MoH&FW), Government of India.

Moreover, the farmers are currently passing through a difficult phase due to COVID-19 pandemic, facing real problems related to agricultural operations (including weeding, pest and disease control), transportation and marketing. Thus, the farmers need quality inputs including pesticides for seed treatment, for growing *kharif* crops especially to guard against the weeds and pests attack which invariably is higher in the rainy season. The proposed ban at this stage, therefore, is likely to affect adversely country's agricultural production targets and may result in specific crop losses by the farmers.

As per the concerns of pesticide industry, any sudden ban will adversely affect the industry's growth, manufacturing and export capabilities, thus making the investments in the manufacturing of these products under 'Make in India' program redundant. It will obviously affect the industry revenue of thousands of crores, resulting in big setback to 'Make in India' / 'Atmanirbhar Bharat' initiative, besides resulting in sharp rise in the prices of substitute products, which could be against the interest of farmers. Further, due to the domestic production of generic pesticides, the cost of crop protection has invariably remained low in India as compared to many countries in the world. Besides, since it is argued that credible alternatives are not available to replace these pesticides, there is full justification to revoke the proposed ban on large number of pesticides which seems to be scientifically and logically unjustified.

Pesticides Management Bill 2020

The Government of India (GoI) has recently placed the Pesticides Management Bill 2020 (PMB 2020) in the Parliament for approval, which is expected to bring in reforms in Insecticides Act, 1968. It embraces the provision of regulating the import, manufacture, sale, transport, distribution and use of pesticides in order to prevent risk to human beings and animals. The new PMB 2020 is in fact expected to set right a number of shortcomings in the regulatory regime around pesticides in India. Though the proposed draft PMB 2020 includes

specific refinements, there are also some genuine concerns such as the need for a time bound, predictable, stable and transparent process for registration of products which need to be addressed immediately by the Government before the Bill is passed. Also, there is a need to revisit the Offences and Punishment clauses in PMB to ensure needed transparency and its effective implementation.

The Hon'ble Prime Minister of India, in his Independence Day speech in 2019, had given a clarion call to the farmers, for lesser use of toxic chemicals. This will be possible, if the PMB 2020 is cleared with incorporation of required necessary provisions for bringing in greater transparency and to have a robust regulatory system. As already mentioned, average consumption of pesticides in India is far lower than many other developed economies. Yet the problem of pesticides residue has not been resolved, thereby, causing concern both for consumers as well as exporters. Pesticide safety, regulation of pesticide use, proper application technologies, and integrated pest management (IPM) are some of the key strategies for minimizing human exposure to pesticides. In fact, issues incorporated in PMB 2017 (placed in Parliament as PMB 2020) have been deliberated threadbare by the National Academy of Agricultural Sciences (NAAS) and important modifications have been suggested (Policy Brief No. 6 - 2020) such as: corrections in definitions of different terminologies, discrepancies in the scope, lack of provision for encouraging indigenous R&D for newer technologies and molecules, to boost the 'Make in India' and 'Atmanirbhar Bharat' initiative of the Government,

bottlenecks in the registration process, data protection, quality testing standards of testing laboratories, manpower, and the testing and analysis of spurious pesticides, punishments, worker's safety, biopesticide quality, crop groupings and their importance in the context of pesticide choice for use, and resistance building and its management, etc. Obviously, all these need to be considered passionately. Besides, there is need to review the existing policy for pesticides use in India and suggest a 'Way Forward' for the rational use of pesticides that ensures proper plant, animal, human and environmental safety as well as food and nutritional security. Lately, there is considerable emphasis on promoting organic farming for which IPM approach is considered to be a better option. This, however, would require considerable support from the pesticide industry to produce good quality biopesticides in sufficient quantity and make them available at farmers' doorsteps well in time.

The Dialogue

In order to deliberate on the above important issues, the Trust for Advancement in Agricultural Sciences (TAAS), a neutral Think Tank for strengthening agricultural research and innovation for development (ARI4D), in collaboration with the Society of Pesticide Science (SPS) India, the Indian Phytopathological Society (IPS), and the Entomological Society of India (ESI) organized a "Stakeholders Dialogue on Current Challenges and Way Forward for Pesticides Management" through webinar on 24 July, 2020 which was attended by

84 participants including eminent experts, senior research managers, government officials representing diverse stakeholder groups, viz., central and state governments, scientific societies and institutions, pesticide industry and farmers. The main objectives of the Dialogue were: i) to discuss major constraints and explore solutions for phasing out banning of certain pesticides, ii) to seek views of stakeholders on proposed 'Pesticides Management Bill 2020' and suggest possible alternatives for accelerated growth of pesticides in India, and iii) to review and suggest reorientation of pesticides management, present regulatory system, existing policies and enabling environment for growth of pesticide industry to promote botanicals and agrochemical R&D in the country.

During the dialogue, in-depth discussions were held on constraints and challenges, banning of pesticides, provisions in Pesticide Management Bill 2020, research and innovation for development of pesticides, policy implications and understanding pesticides industry's perspectives. It was strongly felt that there is an urgent need to develop a clear Road Map for disruptive innovation in the field of chemical pesticides and botanicals through greater investment in R&D, both by public and private sector, and through creation of centres of excellence to achieve desired goals.

The Road Map

Various issues pertaining to the pesticides research and innovation, management and efficient use in the country, adopting a holistic integrated

socioeconomic-ecological-environmental approach were critically examined during the Dialogue. A need was felt to alleviate the trust, transparency, and honesty deficits all along the value chain to create a level playing field and have an enabling environment in place for effective collaboration among public and private sector institutions. For this, participants were unanimous that there is need for a clear **Road Map** to capitalize current opportunities both nationally and internationally and emerge as an important global player in the field of pesticides. For this, a well thought futuristic national policy on agricultural pesticides is needed for accelerating the growth of pesticides sector in India which serves all stakeholders, especially the farmers to have resilience in agriculture through risk avoidance against pests and diseases and get higher income. Thus, the Dialogue led to the following three-pronged recommendations:

I. Reorienting the Regulatory Mechanism

In-depth discussions were held around regulatory mechanisms for pesticides management including time line for processing registration application, re-registration, 'me-too' registration, excessive jurisprudence, regulatory data protection, pricing, draft notification on proposed bulk ban of 27 pesticides including tricyclazole, buprofezin and glyphosate. The bulk ban will affect 134 formulations registered for use on 74 field and horticultural crops, household insects and vectors, and locust management affecting agricultural production. Discussions were also held on rationality of alternatives, ecotoxicity,

reasonable data requirements on bioefficacy and toxicity, and mandatory application of glyphosate by Pest Control Operators (PCOs). The following major recommendations emerged:

1. In the ambit of world trade order and domestic food and nutrition security, there is an urgent need to have a 'National Policy on Agrochemicals' with emphasis on use of safe pesticides. Such a policy will be of immense significance to Indian agriculture since it will encourage good business practices and ethics and provide an enabling environment for accelerated growth (currently around 8.1%) of pesticide sector while protecting the interests of farmers, industry and consumers. The National Policy should also aim for gradual reduction of pesticides while taking into account the technological options like GM technology which redefines the relationship between seeds and pesticides. Hence, Government is urged to give high priority to constitute an expert group, involving different stakeholders, and seek the assistance of Think Tanks like TAAS and NAAS to put in place a forward looking policy draft for consideration and approval of the Government.
2. Farmers need improved seed treatment practices which can help in increasing their crop yields. The Central Insecticides Board and Registration Committee (CIB&RC) should allow usage of custom seed treatment blends developed by seed companies to effectively manage local pests and diseases as allowed in

some advanced countries for which necessary regulatory provisions need to be made. In this context, a national program in Mission Mode needs to be launched for safe and efficient on-farm seed treatment through 'Mobile Seed Treatment Operators' (mostly youth) in the villages especially at the time of seeding/planting. The rural youth could thus be trained as operators by the *Krishi Vigyan Kendras* (KVKs). For this, the funds available under corporate social responsibility (CSR) of private sector could be availed through commitment of pesticide industry.

3. There is need for fast track transparent time-bound on-line registration system. It will be desirable to ensure participation of industry representative in the Central Insecticides Board and Registration Committee. The availability of novel green and safer pesticides would help both the environment and the farmers and would also support 'Make in India' program. Also, re-registration of pesticides (a mandatory practice after 10 years of registration) be done to make sure that genuine producers continue producing good quality and safe pesticides. National expertise through outsourcing needs to be utilized for fast-track evaluation of registration applications. The guidelines on registration of pesticides should also be harmonized and simplified for clarity and efficient functioning. There is an obvious need for post-release monitoring of efficacy and safety of registered pesticides. Accordingly, a major reform in the guidelines, policies and processes is

essentially called for. There is also urgent need to encourage import of early-phase research molecules by simplifying import process and reducing the time required to issue experimental use permit (EUP).

4. The current registration system needs to be revamped based on the recommendations of a duly constituted independent Expert Committee. Registration be granted on the criteria of safety risk assessment and efficacy. Also, the regulators and concerned authorities must decide about their need in the national interest, while taking into account existing Government policy, end-use, risk involved, and the availability of other wide range of safe alternatives. The criteria for pesticide safety evaluation should be measurable and quantitative and not arbitrary in any case. The Registration Committee must conduct preliminary review of the proposal through a panel of independent experts, having no conflict of interest, so as to fulfill above criteria. In case the criteria are not fulfilled or there is specific deficiency, the case be referred for critical review to a high power Expert Inter-Ministerial Committee, ensuring a representation of some experts from industry side also. More opportunities need to be provided for direct dialogue and pre-submission consultations between regulators and the registrants in order to ensure a predictable and efficient registration process. Also, the duration of registration process be made time bound, not to exceed one year for the

- new molecules and six months for “me too” registration, provided all required data are submitted along with the application. For confidence building, the data generation for new molecules should preferably be through notified/ accredited laboratories. Also, attention is needed on reducing Indian crop protection (CP) approval timelines, fast-track emergency solutions, joint review of dossiers, regulations for minor change in formulation, alternate source registration, capacity building, and establishing digital submission and approval portal to increase efficiency.
5. The sale and use of spurious pesticides is indeed a real problem which needs to be addressed on priority. Granting ‘me too’ registrations liberally without verifying the credentials of applicants could encourage malpractices, which need to be curbed through effective post-monitoring inspections and requirement for submission of periodic data on production and sale of such approved pesticides. Production of low quality or spurious pesticides just by a few brings bad name to the industry. It also harms the farmers’ income, health and their safety, including the environmental health. Hence, it must be curbed at all cost and the defaulters be quickly penalized under the law. The Department of Agriculture & Cooperation (DoAC), MoA&FW in collaboration with Indian Council of Agricultural Research (ICAR) should devise an efficient and transparent inspection system to weed out those not following good practices and not having required infrastructure.
 6. For testing quality, there is need to create a chain of ‘good laboratory practices (GLP) compliant accredited pesticide testing laboratories’ in each state where a registrant can get his/ her pesticide tested and certified. These laboratories, either public or private, once notified, should be accessible to all the stakeholders. Also, the infrastructure and human resource capacity for testing at the Central Insecticides Laboratory (CIL) be upgraded to meet international standards since we need to ensure quality as per international standards/ guidelines and the resolution of disputes be settled by a Joint Committee. The effectiveness of bioagents is expected to differ in different habitats/eco-regions and hence these be recommended agro-ecological zone-wise.
 7. The in-country data for new molecules be generated preferably through notified GLP/National Accreditation Board for Testing & Calibration Laboratories (NABL) accredited laboratories only. A special provision for data protection needs to be made for safer and new molecules/formulations that are introduced/developed in the country for the first time, even if off-patent, for a minimum of 5 years from the date of its provisional registration in India. In such cases, there has to be a mandatory clause that concerned applicant must get the molecule registered with required technical data generated through accredited laboratories/institutions within India during the period of protection. This will incentivize and encourage the

innovation for new molecules by domestic companies/manufacturers and also will be in line with 'Make in India' policy of the Government. Undoubtedly, in such cases, the regular registrations have to be granted only after the prescribed safety and efficacy data is submitted by the applicant.

8. The heavy workload of Central Insecticides Board and Registration Committee (CIB&RC), currently with limited staff, has adversely impacted registration timelines for import of new molecules intended for import. The existing process leads to inordinate delays in scrutiny of dossiers requiring a multi-layered approval process. There is urgent need for a quick and transparent on-line registration system which is fully digitized allowing fast tracking of scrutiny status of dossiers as per global best practices. A strong cell within CIB&RC must be established on priority with required trained manpower and Big Data facility for receiving, reviewing and fast tracking of registration applications for the new molecules or formulations and also those for emergency solutions.
9. The recent Government decision to ban 27 pesticides must be revisited. There appears no scientific basis/ rationale for imposing ban and restricting these products from production without a thorough and scientific review. Decisions taken in other countries should not be an important basis for proposing such ban. On the contrary, performance of a pesticide under different edapho-

climatic conditions be taken into account to adjudge the pattern of their behavior, residues, degradation pattern, persistence, etc. Moreover, the voice of farmers, scientists, industry and other stakeholders be heard before taking any such decision. In fact, as per expert committee report headed by Dr Anupam Varma, the 27 pesticides notified for ban were the candidates that were supposed to "continue subject to review" based on data to be submitted over a period of time by the industry which apparently seems to have not been duly followed. Therefore, to ensure transparency, it will be desirable to review the data on priority, as generated by the concerned industry/licensee, through a technical committee and the CIB&RC before taking any final decision in the matter. Risk assessment approach to be considered like those adopted by advanced countries such as USA, Japan, Australia, Canada, etc.

10. There is a serious concern about the proposed ban of four seed treatment chemicals (Carbendazim, Mancozeb, Thiram and Deltamethrin) which are inexpensive and most widely used. This would lead to a collapse of the seed treatment process. Besides, the available alternatives are too costly. Thus, the cost of seed treatment shall go up and will adversely affect the farmers. Since all these fungicides and insecticides are either blue or green triangle products, there is no justification to ban them. Moreover, these are used under the technical supervision by concerned seed companies and their cost is included

in the cost of seeds which farmers are buying willingly. Also, the seed treatment is a standard practice that is recommended in the package of practices by the State Agricultural Universities (SAUs) as an effective option for ensuring better germination and seedling establishment, so critical for better crop stand and productivity. Biotech regulatory reforms are also needed to ensure the introduction of new traits for more effective and efficient weed/ pest management.

11. As stated earlier, the Government Order (GO) for ban on pesticides minimizes the choice for the farmers and puts them obviously under disadvantage. Therefore, the Government must take a science based decision, in consultation with, scientists, farmers, industry and other important stakeholders. For example, a recent ban on glyphosate being imposed in different states, a most studied and safe herbicide approved and used in 160 countries including India by paddy farmers and others including the tea growers for efficient weed control, will put farmers and the industry in dilemma, especially when no effective substitute is available and weed management is critical for assured crop production and higher productivity. Further, the mandatory application of glyphosate in the presence of PCOs as per the recent notification by GoI is not feasible since PCOs are not available in most of the villages. Moreover, any such requirement is expected to encourage malpractices thereby impacting farmers adversely.
12. Agrochemicals are regulated for the purpose of manufacture, marketing and use in the country through Insecticide Act, 1968. Other categories like growth hormones and pheromones, whose toxicity levels are very safe and in fact inconsequential, form important non-invasive measures for pest management, and thus be removed from the regulatory ambit. It is important that we come out with a generic policy on the chemicals that has lasting impact and promotes the growth of agriculture in the country. A stable policy environment and supportive and progressive regulatory system will nurture innovations, offer sustainable solutions to the farmers and will lead to realize “Discover in India and Make in India” objectives.
13. For any pragmatic and agriculture centric Pesticides Management Bill 2020, which is now placed in the Parliament for approval, there is an urgent need to consider the 46th Parliamentary Standing Committee Report that had deliberated extensively the earlier PMB-2008 (PMB 2017/PMB 2020)). In this context, the pragmatic science based recommendations made recently by the National Academy of Agricultural Sciences (NAAS) as per Policy Brief 6 be the basis for discussing the Bill. These recommendations include: encouraging indigenous R&D for newer technologies and molecules, removing bottlenecks in the registration process, data protection, establishing accredited laboratories for quality and phytotoxicity analysis, needed

trained manpower, curbing spurious pesticides, provision of punishments for malpractices, worker's safety, biopesticide quality, crop groupings and their importance in the context of pesticide choice for use, resistance management, etc. As per the practice in vogue, the Bill is expected to be referred to the Parliamentary Standing Committee on Agriculture. It will, therefore, be desirable that the Standing Committee considers inviting concerned scientific societies along with TAAS and NAAS to present their expert views along with other key stakeholders before submitting its report for final decision by the Parliament.

14. To foster innovation and modernization of agriculture, there is an urgent need to adopt and implement advanced technologies for better, efficient and eco-friendly environment. The unmanned aerial vehicle (UAV)/drone technology is coming-up as a viable alternative, which will also ensure reducing human exposure at the time of application of pesticides. Spraying operations by the pesticides companies or trained youth as technology agents on custom hire basis will go a long way in safe and timely application of right pesticides. However, these new application techniques may need ultra-low volume (ULV) formulations of pesticides. Government and Pesticides Industry have to work together to introduce more of ULV formulations in order to reduce the consumption of water during application and also will

promote safety of spray operators. There is also the need to develop civil aviation framework and standard operation procedures (SOP), set-up crop protection application standards, provide farmers/applicators access to technology through import of good quality drones, and provide training to rural youth on drone usage.

II. Enabling Environment for Growth of Pesticide Industry

Efficient and judicious use of agrochemicals and crop protection solutions within the confines of a regulatory framework is important for sustainable agriculture. In India, the agrochemical industry has great potential for further growth in view of current low level of pesticide consumption compared to other agriculturally important countries. Accordingly, various issues relating to crop losses, pesticide registration system, sale of spurious pesticides, weeding out “fly-by-night” operators, banning of pesticides, an enabling environment for faster growth of pesticide industry were discussed at length leading to the following recommendations:

15. As stated earlier, in order to realize the goal of ‘Make in India’ initiative, indigenous manufacturing of pesticides, agrochemicals and their raw materials has to be enhanced a great deal for which special manufacturing zones need to be created with common, shared waste treatment facilities and all other support systems. This would not only make India self-sufficient but would help in

reducing current imports of active ingredients as well as raw materials/ intermediates, mainly from China. For 'Atmanirbhar Bharat', enabling policies around efficient regulatory system, simplified guidelines, incentive through intellectual property (IP) protection and promotion of exports need to be put in place urgently. Also, there is need to create cluster areas for the agrochemical industry. Also, the existing registration guidelines need to be revisited and indigenous manufacturing has to be globally competitive. It is understood that more than 95 per cent discovery molecules have already been introduced in India via imports from developed countries. Hence, faster registration of these new promising molecules need to be ensured to realize the dream of 'Make in India' faster. Now is the time to have a vision to make our agrochemical industry a manufacturing power house and a global hub. In this context, it is felt that the current Indian pesticide Industry turnover can be doubled in the next one decade from present about US\$ 6 billion (with 50% export) to around US\$ 12 billion (aiming at 60-65% export), which will be around 1/5th of current world market of \$ 65 billion). It will also be desirable to focus on enabling policies for trade/ agri-exports through adoption of Codex maximum residue limits (MRLs) and harmonized import tolerances/MRL standards.

- 16 A 'National Council on Agricultural Development (NCAD)' on lines similar to that of GST as recommended by

Dr RS Paroda Committee, needs to be established urgently under the chairmanship of Prime Minister that would ensure effective coordination and harmonization of rules and regulations on agrochemicals between the Central and State Governments and help quick decisions for effective implementation.

17. Urgent action is required to decriminalize the agro-input manufacturing sector without compromising the purity, biosafety, and quality of pesticides, since it can be counter-productive resulting in a negative investment climate. Such expectation is in-line with recent announcements made by the Government during Union Budget 2020 presentation under the Companies Act. There is justified need to adopt prior informed consent (PIC) approach for penalization, as recommended by United Nations Industrial Development Organization (UNIDO) for application of pesticide code of conduct along the value-chain.
18. Comparing global scenario, India has registered very few products (around 270) denying wider/better choice of options to farmers for insect-pest management. Protection of regulatory data (PRD) encourages innovators to discover, protect, register and produce new solutions. In addition to manufacturing and R&D capabilities, this ensures India's position as an investor's hub. Globally, PRD period ranges from 6-15 years (average 10 years). The benefits which will accrue from PRD include accelerated

introduction of newer and safer crop protection products (CPP), immediate data generation for MRL setting of products in use, ensure proper product use through stewardship, protecting sensitive proprietary know-how (impurity profile and product composition) from disclosure to prevent unfair commercial use, increasing agricultural exports, setting-up of R&D facilities in India, outsourcing studies/data generation to Indian research institutes, giving employment to Indian scientists and engineers. PRD will not only help farmers grow more and better food but will also enable faster implementation of 'Make in India' / 'Atmanirbhar Bharat' programs.

19. India lacks in the skill and practice of assessing unregistered pesticides in imported commodities. Hence, as per international norms, GoI needs to build its capability for the detection of pesticide residues in imported commodities and reject them based on presence of pesticide residues otherwise not registered in India. This shall protect India from non-tariff trade barriers otherwise imposed by many countries. For example, EU has banned rice with any level of use of tricyclazole, buprofezin, etc, whereas countries like Japan, USA and India have risk based MRL of 3 ppm of tricyclazole. This also calls for a multilateralism and allows harmonization of MRL standards in India.
20. There is an urgency to alleviate the trust, transparency, and honesty deficits all along the value chain to create a

level playing field and to establish effective collaboration between public and private sectors. One of the major problems of pesticide use is either overuse or use of spurious pesticides. The Indian industry which is apparently fragmented needs to have a clear agenda with a strategic goal to ensure zero tolerance for spurious pesticides and regain the trust of farmers. 'Quick Test Kits' for rapid testing can help minimize this menace. This rampant problem needs to be curbed/dealt with strictly by the Government for which an appropriate policy has to be in place. The farmers need to be provided special service for pesticide application through paid extension involving trained youth (including women). Further, awareness programs about the right kind and safe use of pesticides need to be enhanced among the farmers, for which industry support under CSR could be of great advantage using the concept of Agri-Clinics.

21. There is need for a clear policy direction and support to move forward to register and release biopesticides such as *neem*, *Bt*, *Trichoderma*, etc. Today, though the development of neem based pesticides in India is satisfactory, the overall progress on biopesticide front is not all that encouraging due to lack of required industry support and enabling policy environment. Fortunately, there is a significant shift in the thinking of multinationals now which may be a game changer in near future in the field of chemical pesticides and biopesticides through greater

investment in R&D both by public and private sector and through building of centres of excellence (CoE) to achieve defined mission and goals. Greater attention needs to be given to: i) successful development, commercialization, and adoption of biopesticides in public-private partnership (PPP) mode; ii) strong academic-industry alliance for scaling-up commercialization; product quality, integrity, bioefficacy testing, application and marketing; iii) developing safety indices for biopesticidal formulations; iv) data and IPR protection; v) effective implementation and monitoring of biopesticides usage; vi) selection of proper strains/species of biocontrol agents; and vii) rationalization of registration requirements. An Integrated Pest Management (IPM) approach consisting of improved seeds, including GM crops like Bt cotton, adoption of good agronomic practices, use of biopesticides and chemical pesticides, etc. should be leveraged.

III. Strengthening Pesticide Research and Innovation for Development

The discussion on issues of R&D and innovation centered around: i) development of new molecules-their search, synthesis, isolation, identification, bioactivity, product optimization using synthetic aperture radar (SAR) software, and physico-chemical, preliminary safety information; ii) formulation for recipe development, product optimization

(physico-chemical parameters, bioefficacy, phyto-compatibility, toxicology, etc. and iii) safety aspects-mammalian, avian, environmental, non-target organisms safety/toxicology /compatibility, and transformations, metabolism, detoxification, etc. The important recommendations emerged were:

22. There is an urgent need for intensifying research on design and discovery of new green molecules as a national priority in the spirit of 'Atmanirbhar Bharat' and 'Make-in-India' initiatives and investment in R&D of new molecules needs to be enhanced substantially. India must become a R&D and manufacturing hub for crop protection chemicals and try to become self-reliant. To achieve this, there should be greater participation of both public and private sector from an early phase with defined roles and responsibilities, including benefit sharing. In this context, much greater thrust needs to be given on: i) computer aided bio-centric molecule designing; ii) identifying potential pesticides, health care/health promoting derivatives of biological origin to guide the breeding programs; iii) developing marketable concentrates of health care/promoting derivatives to enrich foods and feeds, bio-stimulants; and iv) solutions to the national/farm driven issues being faced at present. Also, there is need to accelerate crop protection (CP) innovation to develop new low and ultra-low volume products/formulations and drone based application technologies which are safer to crops as well as applicators.

23. A Centre of Excellence (CoE) on Agrochemicals with multifaceted wide spectrum and modern bioscreening facilities needs to be established urgently at the Indian Agricultural Research Institute (IARI), to be gradually elevated to a National Research Centre (NRC) on Agrochemicals, to lay high priority on developing new molecules and undertake related multifarious R&D activities using best techniques and the latest facilities. This Centre must work in a network mode in close collaboration with other advanced institutions/centres in the country under the Council of Scientific and Industrial Research (CSIR), Department of Science and Technology (DST), and Department of Biotechnology (DBT), etc. and in partnership with advanced pesticide companies/organizations to develop comprehensive product technology packages. Also, there is an urgent need to strengthen the Institute of Pesticide Formulation Technology (IPFT) under the Ministry of Chemicals & Fertilizers (MoC&F) in Gurugram. It must promote public-private partnership, skill development, product commercialization, and infrastructure improvement and use of artificial intelligence (AI) and digital technology. This will require Government commitment for much higher investments. Also, strong collaboration is needed among ICAR-IARI New Delhi, IPFT Gurugram, CSIR-Indian Institute of Toxicology Research (IITR), Lucknow, CSIR-Indian Institute of Chemical Technology (IICT), Hyderabad, CSIR-National Chemical Laboratory (NCL), Pune and the reputed private sector laboratories for faster development of new molecules needing investment of millions of dollars, without which the dream of 'Atmanirbhar Bharat' may not be achieved in the field of agrochemicals, especially pesticides.
24. Greater thrust needs to be given to develop low-cost technologies for mass production and bulk availability of biocontrol agents and biopesticides. Careful choice of potential candidates to be used as botanicals/microbials for investigation is essentially required. Also, greater attention needs to be given to their bulk availability, massive *in vitro* regeneration of bioactive part as raw material, cultivation for agrochemical *vis-à-vis* medicinal applications, identifying botanicals that can be raised in drylands and wastelands for making agrochemicals, need-based structural modifications to incorporate bioactivity needs, chemical and bio-prospecting of microbials, and improving identification, multiplication and release process for microbials. There is need to encourage start-ups and strengthen micro, small and medium enterprises (MSME) in well thought-of domains (where product quality can be maintained) so that the country can become self-reliant in the generation and use of quality biopesticides in the near future.
25. There is need to identify critical domains of formulation research,

product development and improvement based on our scientific strength, urgency concerning national needs with focus on indigenous formulations auxiliaries and targeted delivery systems; developing stable and smart formulations of biopesticides (both botanicals and microbials); developing indigenous pesticide formulations for an economical, efficient and safer pest control. Also, there is need to evaluate critically their economics, performance, safety of the newer and conventional formulations; science based increased use of slow/CR products (in India), and develop quick and highly sensitive pesticide residue detection test kits to help farmers for on-farm detection/analysis of pesticide residues and detection of spurious pesticides.

26. In order to ensure safety measures, there is need to: i) generate data simultaneously under varying agro-climatic conditions for required

dissipation/decontamination/remediation studies; ii) develop new methodologies for validation in multiple GLP/accredited laboratories in collaboration with Indian Agricultural Statistics Research Institute (IASRI) having Big Data analytical facility; iii) work out transformation and toxicity trails of actives/products; iv) intensify effort on molecularly imprinted polymers (MIP) for more precision and specificity to target compound for decontamination and use of 'nano-sensors and electronic nose based technologies for on the spot detection of residues in different commodities; and v) introduce 'Good Agrochemical Handling and Application Practices (GAH&AP)' to account for initial deposit based on application technology, dose and time, method and processing of samples, environmental/seasonal variants, worker safety measures, etc.



PROGRAM

Webinar (24 July 2020: 14.00-18.00 hrs)

Co-Chairs	: Dr RS Paroda, Chairman, TAAS, New Delhi : Dr RB Singh, Former President NAAS, New Delhi	
14.00-14.15	Welcome & Setting the Context	Dr RS Paroda, Chairman, TAAS, New Delhi
14.15-14.30	Special Remarks	Dr RB Singh, Former President, NAAS, New Delhi
14.30-14.45	Address by the Guest of Honour	Dr Trilochan Mohapatra, Secretary, DARE & DG, ICAR; and President, NAAS, New Delhi
14.45-15.30	Theme Presentations	
14.45-15.00	Pesticide Research and Innovation for Development –An Overview	Dr BS Parmar, Former Joint Director (Research), ICAR-IARI, New Delhi
15.00-15.15	Pesticide Regulatory and Monitoring Systems- PMB 2020 and Ban of 27 Pesticides	Dr CD Mayee, President, Board of Directors, South Asia Biotechnology Centre (SABC), New Delhi
15.15-15.30	Enabling Environment for Pesticides Development- An Industry Perspective on Make in India	Shri D Narain, Vice Chairman & MD and CEO, Bayer CropScience Limited, Mumbai
15.30-16.45	Panel Discussion on “Way Forward for Pesticide Research, Management and Regulatory Systems”	
	Panelists <ul style="list-style-type: none"> • Shri Ajay Vir Jakhar, Chairman, Bharat Krishak Samaj, New Delhi • Dr Anupam Varma, Former Dean, ICAR-IARI, New Delhi • Dr SN Puri, President, Entomological Society of India, New Delhi • Dr AK Singh, Director, ICAR-IARI, New Delhi • Shri Rajju Shroff, Chairman, UPL India & Chairman, Crop Care Federation of India • Dr PK Chakrabarty, President, Indian Phytopathological Society, New Delhi • Shri Rajendra Velagala, Chairman, Crop Life India, Mumbai • Shri RG Agarwal, Chairman, Dhanuka Agritech Ltd., New Delhi • Shri Pradip Dave, Chairman, Aimco Pesticide Ltd, Mumbai 	

16.45-17.20	General Discussion
17.20-18.00	Concluding Session
17.20-17.35	<p>Remarks</p> <p>Dr SK Malhotra, Agriculture Commissioner, DoAC & FW, New Delhi Dr TR Sharma, DDG (Crop Science), ICAR, New Delhi</p>
17.35-17.55	<p>Concluding Remarks</p> <p>Dr RB Singh, Former President, NAAS, New Delhi Dr RS Paroda, Chairman, TAAS, New Delhi</p>
17.55-18.00	<p>Vote of Thanks</p> <p>Dr Anupama Singh, President, Society for Pesticide Science, India New Delhi</p>

List of Participants

A. Special Invitee

1. Dr Trilochan Mohapatra, Secretary, DARE & DG, ICAR & President, NAAS, New Delhi

B. Science Managers and Scientists

2. Dr RS Paroda, Former Secretary, DARE & DG, ICAR & Chairman, TAAS, New Delhi
3. Dr RB Singh, Former President NAAS, New Delhi & Former Chancellor, CAU Imphal.
4. Dr TR Sharma, DDG (Crop Science), ICAR, New Delhi
5. Dr AK Singh, Director, ICAR-IARI, New Delhi
6. Dr CD Mayee, President, Board of Directors, SABC, & Former Chairman, ASRB, New Delhi
7. Dr SN Puri, Former VC, CAU Imphal & President, Entomological Soc. of India, New Delhi
8. Dr Anupam Varma, Former Dean, ICAR-IARI, New Delhi
9. Dr PK Chakrabarty, President, Indian Phytopathological Society, New Delhi
10. Dr SS Chahal, Former VC, MPUA&T, Udaipur (Rajasthan)
11. Dr BV Patil, Former VC, UAS, Raichur (Karnataka)
12. Dr BS Parmar, Former Joint Director (Research), ICAR-IARI, New Delhi
13. Dr Bhag Mal, Former South Asia Coordinator, BI (CGIAR) & Secretary, TAAS, New Delhi
14. Dr SN Sushil, Former Plant Protection Advisor, GoI; Principal Scientist, ICAR-IISR, Lucknow
15. Dr Jitendra Kumar, Director, Institute of Pesticide Formulation Technology, Gurugram
16. Dr Rajan, ADG, (PP &B), ICAR, New Delhi
17. Dr TP Rajendran, Former ADG (PP), ICAR, New Delhi
18. Dr Umesh Srivastava, Former ADG (Hort), ICAR & Consultant, TAAS, New Delhi
19. Dr HR Sardana, Director, ICAR-NCIPM, New Delhi
20. Dr Rashmi Aggarwal, Dean & Head, Division of Plant Pathology, ICAR-IARI, New Delhi
21. Dr. Anupama Singh, Head, Div. of Agril. Chemicals, ICAR-IARI & President, SPS India, Delhi
22. Dr Chitra Srivastava, Emeritus Professor & Former Head, Division of Entomology, ICAR-IARI & Former President, SPS India, New Delhi
23. Dr Debjani De, Head, Division of Entomology, ICAR-IARI, New Delhi
24. Dr Gita Kulshreshtha, Former Professor, Agril. Chem. Division, ICAR-IARI, New Delhi
25. Dr KK Sharma, NC, AICRP (Pesticide Residues), ICAR-IARI, New Delhi
26. Dr RM Gade, Zonal President, IPS (Western Zone), Asso. Dean, VN College of Agricultural Biotechnology (Dr. PDKV), Yavatmal (Maharashtra)
27. Dr VV Ramamurthy, Former Professor, Division of Entomology, ICAR-IARI, New Delhi
28. Dr C Devakumar, Former ADG (EPD), ICAR & Principal Scientist, Division of Agril. Chemicals, ICAR-IARI, New Delhi
29. Dr Jaspal Kaur, Zonal President (North Zone), Plant Pathologist, Dept of Plant Breeding & Genetics, PAU, Ludhiana
30. Dr Suresh Walia, Former Emeritus Scientist & Professor, Division of Agril. Chemicals, ICAR-IARI, New Delhi.
31. Dr Samundar Singh, President Elect, International Weed Science Society, Hisar (Haryana)
32. Dr Robin Gogoi, Secretary, IPS & Principal Scientist, Division of Plant Pathology, ICAR-IARI, New Delhi
33. Prof BN Chakraborty, Chief Editor, IPS; Dept of Biological Science, Aliah University, New Town, Kolkata
34. Dr P Nallathambi, Zonal President, IPS (Southern Zone), Principal Scientist, ICAR-IARI Regional Station, Wellington, The Nilgiris (Tamil Nadu)
35. Dr B Srinivasulu, Zonal President, IPS (Central Zone), Director of Extension, Dr YSRHU, Venkataramannagudem, West Godavari (Andhra Pradesh)
36. Dr Kaushik Banerjee, National Fellow, ICAR-NRC-Grapes, Pune (Maharashtra)
37. Dr Supradip Saha, General Secretary, SPS, New Delhi
38. Dr. Aditi Kundu, Scientist (Senior scale), Division of Agricultural Chemicals, ICAR-IARI, New Delhi
39. Dr. Abhishek Mandal, Scientist, Division of Agricultural Chemicals, ICAR-IARI, New Delhi
40. Dr. Anirban Dutta, Scientist, Division of Agricultural Chemicals, ICAR-IARI, New Delhi
41. Dr. M.S. Saharan, Principal Scientist, Division of Plant Pathology, ICAR-IARI, New Delhi
42. Dr. Malkhan Singh Gurjar, Scientist (Senior Scale), Division of Plant Pathology, ICAR-IARI, New Delhi
43. Dr. Kalyan K. Mondal, Principal Scientist, Division of Plant Pathology, ICAR-IARI, New Delhi

C. Government Officials

44. Dr SK Malhotra, Agriculture Commissioner, DoAC, MoA&FW, Krishi Bhawan, New Delhi
45. Shri Rajesh Malik, Plant Protection Advisor, Directorate of Plant Protection Quarantine & Storage, Old CGO Complex, NH-IV, Faridabad (Haryana)
46. Dr JP Singh, Secretary, CIB&RC, Directorate of Plant Protection Quarantine & Storage, Old CGO Complex, NH-IV, Faridabad (Haryana)

D. Farmers

47. Shri Ajay Vir Jakhar, Chairman, Bharat Krishak Samaj, A-1, Nizamuddin West, New Delhi
48. Dr BB Tyagi, Farmer, Bulandshahar (UP)
49. Shri Bhagirath Chaudhary, Progressive Farmer & Director, SABC, New Delhi

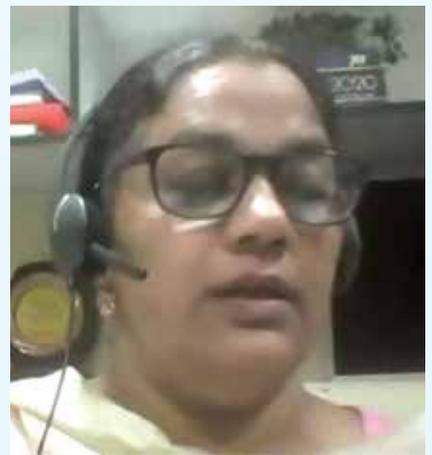
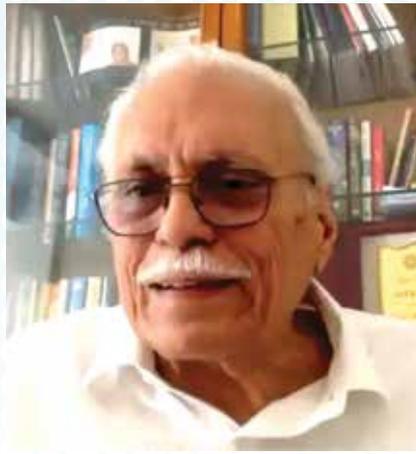
E. Industry Representatives

50. Shri Rajju Shroff, Chairman, UPL & Chairman, Crop Care Federation of India, Mumbai
51. Shri Rajendra Velagala, Chief Executive, Agricultural Solutions - South Asia, BASF & Chairman, Crop Life India, Mumbai
52. Shri D Narain, Vice Chairman & MD & CEO, Bayer CropScience Limited, Mumbai
53. Shri Salil Singhal, Chairman and Managing Director, PII Ltd, Gurugram
54. Shri KV Subbarao, MD - South Asia at Corteva agri science, Hyderabad
55. Dr RG Agrawal, Chairman, Dhanuka Agritech Ltd., New Delhi
56. Shri Pradip Dave, Chairman, Aimco Pesticide Ltd, Mumbai
57. Shri Rafael del Rio, Head of South Asia, Syngenta, Pune
58. Dr Ram Kaundinya DG, Federation of Seed Industry of India, New Delhi
59. Shri Rajesh Aggarwal, IIL (P) Ltd., New Delhi
60. Dr Ajit Kumar, Technical Head, UPL, Mumbai
61. Dr AN Chandrani, Sr Vice President, NPCC, Indofil India Ltd., Mumbai
62. Shri Vipin Saini, CEO, Biological Agri Solutions Association of India, Faridabad
63. Dr Sajal Biswas, Director Business Development at Nisso Chemical India, Gurugram

64. Shri Raju Kapoor, Director, Industry & Public Affairs at FMC Corporation, New Delhi
65. Dr JC Majumdar, Technical Advisor at CCFI, Gurugram
66. Dr Rajvir Singh Rathi, Head - Agricultural Policy & Stakeholder Affairs at Bayer Crop Science, New Delhi
67. Dr Amitava Sanyal, GM (Regulatory Affairs), Sumitomo Chemical India, New Delhi
68. Shri Asitava Sen, CEO, CropLife India, New Delhi
69. Dr Arpita Roy, General Manager, Registration & Regulatory Affairs, Adama India, Pvt Ltd. Hyderabad
70. Shri P Thota, President FMC India, Mumbai
71. Shri Srinivasa Kumar, Head of Market Development, Bayer Crop Science, Hyderabad
72. Dr Ravi Hegde, Head - Regulatory Affairs & Product Development, UPL, New Delhi
73. Shri Ankur Aggarwal, MD, Crystal Crop Protection Ltd, New Delhi
74. Shri Deepak Shah, Vice-President-PMFAI & CMD, Sulphur Mills Ltd., Mumbai
75. Dr KN Singh, Managing Committee Member, PMFAI & Vice President, Gharda Chemicals Ltd., Mumbai
76. Dr Samir Dave, Director, AIMCO Pesticides Ltd. & Chairman, AgroCare, Mumbai
77. Shri KC Ravi, Vice-Chairman, Syngenta India Ltd, Pune
78. Shri Sanjiv Lal, Vice Chairman, Rallis India Ltd, Mumbai
79. Shri Shalabh Jain, Director - Supply Chain Management, Adama India Pvt Ltd, Hyderabad
80. Shri NC Rane, Chief Operating Officer, Indofil Industries Ltd, Mumbai
81. Shri Anil Kakkar, Sumitomo Chemical India Pvt Ltd, New Delhi
82. Dr Kishor Nahar, Bayer CropScience Limited, Mumbai
83. Dr Sangeeta Dawar, Outreach Manager, Bayer CropScience Limited, Mumbai

F. TAAS Secretariat

84. Ms Simmi Dogra, Office Secretary, TAAS, New Delhi



Important TAAS Publications

- The Eighth Foundation Day Lecture on “Sustainable Agricultural Development - IFAD’s Experiences” by Dr. Kanayo F. Nwanze, President, IFAD, August 5, 2014.
- Need for Linking Research with Extension for Accelerated Agricultural Growth in Asia - Strategy Paper by Dr. R.S. Paroda, September 25, 2014.
- Global Conference on Women in Agriculture - Proceedings and Recommendations, March 13-15, 2015.
- Brainstorming Workshop on Upscaling Quality Protein Maize for Nutritional Security - Recommendations, May 21-22, 2015.
- The Ninth Foundation Day Lecture on “21st Century Challenges and Research Opportunity for Sustainable Maize and Wheat Production” by Dr. Thomas A. Lumpkin, Former DG, CIMMYT, September 28, 2015.
- National Dialogue on Efficient Management for Improving Soil Health - Soil Health Declaration - September 28-29, 2015.
- Regional Consultation on Agroforestry: The Way Forward - New Delhi Action Plan on Agroforestry, October 8-10, 2015.
- National Dialogue on Innovative Extension Systems for Farmers’ Empowerment and Welfare - Road Map for an Innovative Agricultural Extension System, December 17-19, 2015.
- Round Table Discussion on Promoting Biotech Innovations in Agriculture and Related Issues - Proceedings & Recommendations, August 4, 2016.
- Awareness-cum-Brainstorming Meeting on Access and Benefit Sharing – Striking the Right Balance – Proceedings, October 22, 2016.
- Delhi Declaration on Agrobiodiversity Management – Outcome of International Agrobiodiversity Congress 2016, November 6-9, 2016.
- National Conference on Sustainable Development Goals: India’s Preparedness and Role of Agriculture, May 11-12, 2017.
- Policy Brief on Efficient Potassium Management in Indian Agriculture, August 28-29, 2017.
- Regional Policy Dialogue on Scaling Conservation Agriculture for Sustainable Intensification, Dhaka, Bangladesh, September 8-9, 2017.
- Policy Brief on Scaling Conservation Agriculture in South Asia, December 2017.
- Retrospect and Prospect of Doubling Maize Production and Farmers’ Income – Strategy Paper by Dr. N.N Singh, September 10, 2017.
- Indian Agriculture for Achieving Sustainable Development Goals - Strategy Paper by Dr. R.S. Paroda, October, 2017.
- Strategy for Doubling Farmers’ Income - Strategy Paper by Dr. R.S. Paroda, February, 2018.
- Livestock Development in India - Strategy Paper by Dr. A.K. Srivastava, Member, ASRB & Trustee, TAAS, February, 2018.
- Policy Brief on Agricultural Policies and Investment Priorities for Managing Natural Resources, Climate Change and Air Pollution - April, 2018.
- Women Empowerment for Agricultural Development - Strategy Paper by Dr. R.S. Paroda, May, 2018.
- Brainstorming Meeting on Harnessing Intellectual Property to Stimulate Agricultural Growth – Proceedings and Recommendations, July 27, 2018.
- Road Map on Motivating and Attracting Youth in Agriculture (MAYA), November 2018.
- Regional Conference on Motivating and Attracting Youth in Agriculture (MAYA) - Proceedings and Recommendations, August 30-31, 2018.
- Motivating and Attracting Youth in Agriculture - Strategy paper by Dr. R.S. Paroda, November, 2018.
- Tenth Foundation Day lecture on “Can India Achieve SDG 2 – Eliminate Hunger and Malnutrition by 2030” by Dr. Prabhu Pingali, Professor in the Charles H. Dyson School of Applied Economics and Management at Cornell University, January 24, 2019.
- Urgency for Scaling Agricultural Innovations to Meet Sustainable Development Goals (SDGs) – Strategy Paper by Dr. R.S. Paroda, April, 2019.
- Horticulture for Food and Nutritional Security - Strategy Paper by Dr. K.L. Chadha and Dr. V.B. Patel, October, 2019.
- Crop Biotechnology for Ensuring Food and Nutritional Security - Strategy Paper by Dr. J.L. Karihaloo and Dr. R.S. Paroda, December, 2019.
- A Road Map on Policy Framework for Increasing Private Sector Investments in Agriculture and Enhancing the Global Competitiveness of Indian Farmers, December, 2019.
- A Road Map on Efficient Land Use and Integrated Livestock Development, February, 2020.
- National Dialogue on Land Use for Integrated Livestock Development – Proceedings and Recommendations, 1-2 November, 2020
- A Road Map on Stakeholders Dialogue on Way Forward for the Indian Seed Sector, June, 2020.
- Biofertilizers and Biopesticides for Enhancing Agricultural Production - A Success Story by Dr. Basavaraj Girennavar, June, 2020.



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