

Proceedings of the Workshop

“पराली - एक पूँजी” (*Parali - Ek Punji*)

20th February, 2023

Venue: Hotel Radisson Red, Chandigarh (Mohali)



Commission for Air Quality Management in NCR & Adjoining Areas
(CAQM)

The Commission for Air Quality Management in NCR and Adjoining Areas in collaboration with various stakeholders including the State Governments of Punjab and Haryana organized a one-day workshop on " पराली - एक पूँजी" (*Parali - Ek Punji*)" on 20th February, 2023 at Hotel Radisson Red, Sector-66, Mohali (Chandigarh) to deliberate upon the need to control पराली (stubble\paddy straw) burning to improve the overall air quality in NCR & Adjoining Areas, utilization of 'पराली' (stubble) as 'एक पूँजी' (resource) and effective means for *in-situ* / *ex-situ* management of paddy stubble. The workshop included an inaugural session, two technical sessions and one special session.

Inaugural Session

The workshop was opened with reciting of "Deepa Shlokam" and "Lighting of Lamp" by Dr. M. M. Kutty, Chairperson, Commission for Air Quality Management (CAQM) and other dignitaries followed by felicitation of distinguished persons on the dais.

Technical Session-I:

Theme: Sustainable Paddy Stubble Management

The Member-Secretary, CAQM, welcomed the distinguished guests, stakeholders, participants, media representatives etc. and highlighted the significance of the workshop. The vital importance of management of stubble burning in the context of Air Quality of Delhi-NCR air shed by utilizing "पराली" (stubble\paddy straw) "एक पूँजी" as a resource and the multi-dimensional benefits of sustainable management of paddy straw towards mitigating air pollution, climate change and boosting economy were elaborated. He gave a presentation on the status of stubble burning, management strategies and efforts which are being made towards control of stubble burning.

The presentation elaborated the strategies for reducing generation of paddy straw, management plans for prevention and control of stubble burning including various *in-situ* and *ex-situ* management plans, complementary use of bio-decomposer, awareness through IEC activities, action taken by the Commission etc. The indicative quantitative impact of burning paddy straw in fields was explained stressing that burning 1 MT straw ends up with release of 3 Kg of Particulate Matter (PM), 2 Kg SO₂, 60 Kg CO, 1460 Kg of CO₂ and 200 Kg ash. It was emphasized that time has come to take further steps not only for effective management of 27 million tons of "पराली" (paddy straw) generated cumulatively in the state of Punjab and Haryana, but also gainful utilization of "पराली" (paddy straw) as an important resource to harness dual benefits in terms of improving farmer's income and achieving environmental benefits besides long term positive impact on climate change.

The overall impact of burning paddy straw on the ambient air quality of Delhi NCR, ranged from 10-13% on average and may go up to even 45-50% depending on the burning incidences reported on a particular day, during winter season. It also highlighted the importance of collective and collaborative efforts to reduce instances of burning of “पराली” (stubble/ paddy straw) up to ~ 30% and ~ 48% as witnessed in Punjab and Haryana respectively during the last paddy harvesting season. It emphasized the aim of achieving the goal of ‘zero farm fires’ with collective efforts of all stakeholders. The presentation further highlighted the requirement of robust supply chain of paddy straw and setting up briquetting/pelleting plants at strategic and vulnerable locations in sufficient numbers for effective *ex situ* stubble management. Overall, the presentation touched various aspects of paddy straw management and related issues along with broad contours of the subjects to be deliberated during the technical sessions.

The Technical Session-I on the theme “Sustainable Paddy Stubble Management” dedicated primarily on the management of stubble by effective *in-situ* techniques through optimal utilization of CRM machineries and IEC activities was chaired by Professor (Dr.) Adarsh Pal Vig, Chairman, PPCB. During this session four presentations were made by Director, Indian Agricultural Research Institute (IARI); representatives of Ministry of Agriculture and Farmers’ Welfare, Govt. of India; Department of Agriculture; Science, Technology and Environment, Govt. of Punjab and Department of Agriculture & Farmers Welfare, Government of Haryana, wherein various strategies, and actions taken by Central and State Government agencies in this regard were explained.

Dr. A.K. Singh, Director, IARI highlighted the options and technologies developed by IARI. He elaborated the plant breeding related activities and developments that could facilitate effective paddy straw management by adopting short duration varieties to reduce paddy cycle time, making plant varieties resistant to insect infestation, promotion of other crops like millets etc. He discussed about the significance of various basmati varieties developed by IARI specifically PUSA 1121, 1401, 1509, 1692, 1897 and some other newly developed varieties during last two years. He further elaborated various aspects of crop diversification and use of PUSA bio-decomposer for *in-situ* management of paddy straw also touching upon various *in-situ* and *ex-situ* options available.

Smt. S. Rukmani, Joint Secretary and Shri A.S. Meshram, Deputy Commissioner, MoAFW, Govt. of India, elaborated on the support given by MoAFW to the Governments of Punjab, Haryana, Uttar Pradesh and NCT of Delhi for the management of Paddy straw under the scheme called “Crop Residue Management” running since 2018-19. Central funds of more than Rs. 3000 crore have been released to these States in the last five years, for providing crop residue management (CRM) machines and for IEC (Information Education & Communications) campaigns.

It was stated that this has resulted in reduction in paddy straw burning in various States and lot of further efforts are needed to control stubble burning. Statistical data was also shared depicting district wise paddy straw burning in Punjab and Haryana to understand the gravity of situation and efforts needed to control it, highlighting the need for putting in place an effective mechanism by the State Governments for ensuring optimum utilization of CRM machines.

Shri Sumer Singh Gurjar, Principal Secretary (Department of Agriculture & Farmers Welfare), Government of Punjab, gave a presentation on the issue of paddy straw management from the perspective of Punjab. He elaborated the efforts made by Government of Punjab to ensure overall reduction in paddy growing area and reduction brought in farm fire incidents. He stated that the Action Plan is being implemented at district and block levels and highlighted the efforts made towards crop diversification, providing incentives to the industries, reimbursement of state GST, waiving of registration fee, provision of land lease for setting up paddy straw-based industry, use of paddy straw in brick kilns and thermal power plants etc. He also touched upon the efforts made for promoting use of CRM Machines at village level including by providing CRM machines on rental and free basis for small & marginal farmers, use of co-operative machinery tracker for optimum utilization of machines etc. He concluded by stating that action plan for ensuing paddy harvesting season is under finalization and will be submitted to the Commission by April, 2023, targeting 50% reduction in fire counts during the current year compared to last year. He further assured that all out efforts would be made for effective implementation of Action Plan.

Dr. Narhari Bangar, Director (Agriculture), Haryana, shared the statistical data regarding paddy cultivation, straw generation, crop diversification and reduction in straw burning instances owing to efforts made by the Government of Haryana. He also touched upon efficacy of PUSA bio-decomposer in Haryana and efforts made to use straw in gaushalas. He stated that the Action Plan for control of stubble burning for Haryana is being finalized and will target to achieve zero farm fires during the current paddy harvesting season.

At the end of the session, Professor (Dr.) Adarsh Pal Vig, Chairman, PPCB and Session Chair concluded the session highlighting the important aspects of the discussion by various speakers in the session. He stressed upon the need for using site-specific methods for paddy straw management depending on the

local conditions also by learning from each other to ensure that paddy straw is treated as a resource (पूँजी) and not as waste.

Technical Session II

Theme: Efficient *ex-situ* paddy Stubble Utilisation

The Technical Session-II on the theme “Efficient *ex-situ* paddy Stubble Utilization” dedicated primarily on effective *ex-situ* management of stubble was chaired by Shri Raghavendra Rao, Chairman, HSPCB. In the 2nd technical session eight presentations were made namely by Lt. Col. Monish Ahuja (Retd.), CMD, PRESPL; Sh. Shantanu Gupta, ED (AE&SD), IOCL; Sh. Ashish Kumar, MD, Verbio India Pvt. Ltd.; Sh. Ved Ratna Sinha, CEO, Sukhbir Agro Energy Ltd; Mohd. Moosa of M/s Shree Ganesh Edibles Pvt. Ltd.; Mr. Bhagat Gill of M/s Sukhvir & Co. Brick Industries; Sh. Ajith Rao, partner, M/s Badshah Industries and Sh. Sameer Bhansali, CMD, ASAN Building systems, wherein various *ex-situ* management options and already developed techniques, were explained.

Lt. Col. (Retd.) Monish Ahuja, MD, PRESPL suggested a eleven-part solution, titled Project 42, named after the quantum of paddy straw generated in the states of Punjab, Haryana and Western Uttar Pradesh. The project envisages a combination of different technologies for conversion of paddy straw to useful products such as CBG, 2G Ethanol, Sustainable Aviation Fuel, Green Hydrogen, Particle Board, etc. The project focuses not only on supply side aspects but also demand and market creation, aiming at the development of a proper ecosystem for paddy straw utilization. The associated financial implications and support required from the Government such as capital support, tax incentives, carbon credits, policy interventions, etc. were also highlighted during the presentation. He especially focused on financial innovation to create bankable projects for *ex-situ* stubble management.

Sh. Shantanu Gupta, ED (AE&SD), IOCL presented the operational aspects, including elements of the paddy straw supply chain of the 2G ethanol plant, which was inaugurated by the Hon’ble Prime Minister on August 10, 2022, and is expected to utilise about 2.2 lakh MT of paddy straw every year for producing around 3 crore litres of ethanol. While elaborating the difference between 1G and 2G Ethanol, he indicated that land for setting up biomass depots and procurement of balers are some of the issues that need to be addressed. He stressed the need for State Government's support towards *ex-situ* crop management through long term land allotment, subsidy on procurement of balers by contractors and corporates, a pre-determined pricing system for paddy straw procurement, performance incentives to biofuel plant owners etc.

Sh. Ashish Kumar, MD, M/s. Verbio India Pvt. Ltd. informed that commercial production of CBG has commenced in its paddy straw based CBG plant in Sangrur, having production capacity of 33TPD CBG and 750 TPD fermented bio manure. The unit would utilise 1.2 lakh tonnes of paddy straw annually, which is equivalent to stubble management of about 50,000 acres. The entire supply chain for the plant is taken care of by M/s. Verbio itself, from collection of paddy straw to production of CBG. The CBG off take is assured and sold/supplied by IOCL through its retail dispensing units. He laid emphasis on the importance of involving the community to move towards an agro-economic model, where farmers would supply paddy straw to the unit and the unit in return, would provide manure to the farmers. He sought support in the form of financial subsidy for procurement of machinery, help from State Governments for developing storage infrastructure and creating awareness amongst farmers.

Sh. Ved Ratna Sinha, CEO, M/s. Sukhbir Agro Energy Ltd. made a presentation on use of paddy straw in biomass-based power plants. Three such plants having capacity in the range of 14-18 MW in Punjab and two 15 MW biomass-based power plants in Haryana are presently operational, out of which four are operating on 100% paddy straw. Highlighting that the cost of conversion of straw to some useful product is critical, he expressed that conversion of straw to generate power is cost-effective. He was of the view that generation of power from biomass can help meet the increasing power demand as there are about 120-150 million tonne surplus biomasses in India, which could result in generation of 18,000 MW of green power.

Mohd. Moosa of M/s Shree Ganesh Edibles Pvt. Ltd. made a presentation on use of paddy straw-based power generation for industrial operation and explained about the on-going power projects and development of different capacity turbines for these projects. He was of the view that paddy straw is a cheap fuel option compared to others such as coal and pet coke and use of biomass fuels has both environmental and economic benefits including revenue generation for farmers and jobs creation at local level. He requested the Govt. for introduction of schemes that provide incentives/ financial assistance towards capital cost of paddy straw-based power plants and also for collection, storage and transportation of paddy straw being cost intensive activities.

Mr. Bhagat Gill of M/s Sukhvir & Co. Brick Industries gave a presentation on his experience of operation of brick kiln using paddy straw as a fuel and demonstrated that paddy straw is a viable alternate to coal. He informed that the unit has successfully replaced 100 % coal with paddy straw based pellets and is able to produce bricks at the same operating conditions (temperature) as achieved by using coal, while achieving environmental benefits in terms of lower PM emissions. He also informed that with in-house pellet production, he is supplying paddy straw-based pellets to other kilns as well.

Mr. Ajith Rao, partner in M/s Badshah Industries informed that conversion of paddy straw to torrefied pellets for use in power plants provides benefits such as high energy density, grinding index equivalent to that of Indian Coal and the product being hydrophobic, helps in addressing the issue of long-term storage of final product unlike non-torrefied pellets. This is similar to the production of charcoal and can be termed as bio-coal. He further informed that such plants are commercially viable and the option of torrefaction could be helpful to address the issue of management of various types of agriculture waste products including municipal solid waste and highlighted that their firm is operating number of plants using various types of agriculture wastes. He sought Government's support towards capital investment and other logistical support for management of straw.

Sh. Sameer Bhansali, CMD of ASAN Building systems explained about the potential of utilizing paddy straw for production of particle board which can be used for roofing, flooring and other similar purposes as construction material. The product is environment friendly, reduces dust emissions, fire resistant, safe and is a 100% green product. The manufacturing does not involve use of any kind of additives, PU and formaldehyde. He further informed that they are running a plant in Uttarakhand and that product is tested and certified by CBRI and other NABL certified laboratories.

While concluding the Technical Session – II, Sh. Raghvendra Rao, Chair of the Session summarized the salient aspects of the presentations and highlighted the immense potential of *ex-situ* biomass utilization.

Special Session

Member Secretary, CAQM welcomed the distinguished guests and set tone for the next session explaining the importance and scope of *ex-situ* management strategy to control stubble burning through a detailed presentation. The presentation dealt with various techniques / technologies of utilization of paddy straw under *ex-situ* management plans; targeted utilization of paddy straw in the previous and current year and highlighted the importance of putting in place a robust supply chain eco-system for ensuring assured straw supply.

The special session was chaired by Sh. Bhupender Yadav, Hon'ble Minister EF&CC, Govt. of India. Dr. M. M. Kutty, Chairperson, CAQM apprised in detail the Hon'ble Minister, Chief Ministers of Haryana and Punjab and Ministers on the dais about the proceedings of the forenoon session covering various *in-situ*, *ex-situ* and other management options for achieving sustainable paddy stubble management with the aim of elimination of stubble burning in the region. The session included addresses by the Hon'ble Chief Ministers of Government of Punjab and Government of Haryana followed by special address by Hon'ble Minister EF&CC, Govt. of India and an open interactive session with NGOs, social and religious groups, FPOs, entrepreneurs, industry representatives etc with Hon'ble Minister (EF&CC, Govt. of India) Shri Bhupender Yadav.

Address by Hon'ble Chief Minister, Punjab on 20.02.2023

The Hon'ble Chief Minister, Punjab welcomed and thanked Sh. Bhupinder Yadav, Hon'ble Union Minister Environment, Forest and Climate Change, Govt. of India and Hon'ble Chief Minister Haryana for attending the workshop "Parali-Ek Punji" at Mohali, Punjab.

Hon'ble Chief Minister, Punjab said that the burning of *Parali* has been a big issue for last many years, because the farmers had no solution for management of agricultural residue generated after harvesting of crops. Farmers do not want to burn *Parali*, as the smoke generated from burning of *Parali* first affects the farmers and their families before its dispersal to other parts of the region. The farmers want solution for this problem. There is very less gap between cultivation of paddy and sowing of wheat. The procurement of paddy is completed by about 30th October and the farmers have to sow wheat in first week of November, so they have only 7-10 days' time to prepare the fields for sowing of wheat. If the Central Govt. and State Govt. give assurance that the *Parali* will be lifted and the farmer will be paid then the farmers may not resort to *Parali* burning. He also mentioned that the companies which are producing bio-gas, manure and electricity from *Parali* must be encouraged to establish more such units. One such unit has been established in Punjab by M/s Verbio in Lehragaga, District Sangrur. This plant consumes about One lakh MT *Parali* and has helped to resolve the issue of stubble burning in about 47,000 acres. However, this quantity is very less, as the paddy is cultivated in 75 lakh acres in Punjab. When more such units are established in the State, then the farmers will not burn any stubble, as *Parali* will become a source of income for them.

He further said that in order to manage stubble, the varieties of paddy such as PR-126, PR-127, PR-129 which are taking less time to ripe is being promoted. These varieties take about three months to mature also consume less water. On the other hand, PUSA 44 takes 153 days for maturing and generates more *Parali* compared to short duration varieties. The State Govt. is promoting crop diversification and encouraging farmers to cultivate cotton crop in Abohar, Fazilka, Talwandi Sabho, Bathinda and Muktsar areas. Earlier, the farmers were demoralized with cotton crop due to problems like inferior seeds, white fly and pink worm. Sugarcane is also an alternative to paddy crop and good quality of sugarcane can be produced in the State. But, the problem with sugarcane is that the farmers are facing difficulties in selling and getting timely payment. This is the first time that Punjab Sugerfed has cleared all the payments of farmers and State Government has given price of Rs. 380 per quintal for sugarcane. Some parts of the State are known for other crops like Pathankot for Litchis, Abohar/Fazilka for Oranges, Jalandhar for Potatoes and Kapurthala for Garlic. We have to set up processing facilities to handle these crops. Other crops like pulses, sunflower, maize, bajra, etc. can also be grown in Punjab. In fact, there is no crop which cannot be cultivated in Punjab, due to its fertile land.

However, we have to adopt modern techniques of sowing, spraying, watering and selling of crops to control pollution as well as to increase the income of farmers.

Hon'ble CM, Punjab requested Hon'ble Union Minister to provide MSP for other crops. He said that the Government has challenges to ensure same profit to the farmers with respect to other crops, as compared to paddy if the farmers diversify to other crops. This issue needs to be sorted out to enable farmers to move towards other crops and to control stubble burning. Legal action against farmers for stubble burning is not a solution. We have to give alternate solution to the farmers. The farmers, who are producing food for the country are in debt and committing suicides. They are totally depended on their crops and any calamity like hailstorm can adversely affect the farmers leading to financial difficulties. In such situation, farmers face the problem of debt. Dairy farming, fishery and shrimp farming also need to be promoted. Shrimp farming is now very popular in Jalalabad and Ferozepur area of Punjab.

The Hon'ble CM of Punjab said that a Government - Farmers meet was organized by the Government on 12.02.2023 at Punjab Agricultural University, Ludhiana, which was attended by 15,000 farmers. During that meet, we have asked farmers about requirement of water in canals and the farmers engaged in cultivation of cotton crop informed that if they get water in canals by 1st April, then no worm can damage their cotton crops. To promote cultivation of cotton crop, the Government has given assurance that they will get water by 1st April. The cotton crop will help the textile industry in the State. Ludhiana is a textile hub. The Government is also organizing Business Summit, to set up textile and agro based companies in the State. 80% of tractors, cycles and cycle parts of the Country are manufactured in Punjab. Tata steel is also investing in Punjab and the proposed plant will be the second largest plant in the country after Jamshedpur. There is no shortage of talent in Punjab and whoever comes to Punjab and work honestly will achieve prosperity and will not face any loss. The people of Punjab are well known for their ideas and successful Punjabis can be seen in various parts of the world.

The Hon'ble CM, Punjab requested Union Minister to support State in order to provide better environment to the people. He said that the Punjab was leader in freedom fighting, green revolution and in coming days it will also become leader in industrialization and in cultivation of different crops.

Address by Hon'ble Chief Minister, Haryana

The Hon'ble Chief Minister, Haryana greeted Sh. Bhupinder Yadav, Hon'ble Union Minister Environment, Forest and Climate Change, Govt. of India, Hon'ble Chief Minister Punjab, Hon'ble Ministers from State of Punjab and Haryana.

Hon'ble Chief Minister, Haryana said that the matter / issue "*Parali- Ek Punji*" is very important and to work on this subject is in fact service to humanity. Farming is being done in this region for the last 5,000 years and the farmers were managing residues of crops by using it for different purposes. With abundance of residues in the recent past, farmers have started to burn residues to clear fields. The farmer did not know what he has to do with paddy stubble. The stubble of basmati paddy is used as fodder for animals but stubble of non-basmati paddy is not consumed by animals. Now, many options are available to use paddy stubble and with these options paddy straw can be turned into wealth. Now, biogas, ethanol and pellets from *Parali* are made, which can be used as source of energy. For promoting use of such uses of *Parali*, there is a need to create awareness among farmers and to support industries engaged in utilization of *Parali*. With the support of Government, this problem can be solved and elimination of burning incidents can be achieved. The products like biogas, ethanol and pellets made from *Parali* not only give economic value to *Parali* but also generate employment opportunities.

The Hon'ble Chief Minister further said that the Government has provided subsidy for machinery procurement to farmers for management of *Parali* and farmers who are unable to purchase such machines can get them through custom hiring centers. Earlier, the Government has provided incentive of Rs. 1000/acre to farmers, but the amount now has been increased to Rs. 2500/acre. An ethanol plant has been established in Panipat, which will consume about 2 lakh MT of *Parali*. Total 9 lakh MT of *Parali* will be consumed in bio-gas plants of the State and 2.5 MT of *Parali* is being used as fodder. The *Parali* will also be used in coal based thermal plants. But, consumption of *Parali* is less as compared to its generation in the State. The Government has also plan to reduce area under cultivation of paddy. To adopt crop diversification, the Government has launched "Mera Pani Meri Virasat" scheme, which has substantially supported water conservation and benefited farmers in large scale. Last year, the farmers have reduced area under paddy cultivation by about 1 lakh acre.

The Hon'ble Chief Minister, Haryana informed that the stubble burning cases in Haryana during 2021 were 6,987, which have been decreased to 3660 during 2022, i.e., a decrease of about 48 %. The Government has also appealed to the farmers not to burn stubble and the farmers have given very positive response in this regard. The Government is also taking strict action against the farmers who are still indulging in unsustainable practice of stubble burning.

The Hon'ble CM also requested NGOs and other organizations working in this field to come up with new and innovative ideas, so that same can be implemented. The Government has machinery and system for implementation of these ideas. The best use of stubble is in industries and with large scale use in industries, income of the farmers can be increased. It was assured that the Government will consider all innovative ideas and will work on it for betterment of environment and farmers.

Address by Sh. Bhupender Yadav, Hon'ble Minister, Environment, Forest & Climate Change, Government of India

The Hon'ble Minister, Environment, Forest & Climate Change, Government of India said that he is here to seek collaborative and collective efforts especially from the State Governments in the interest of clean environment and better air quality. He expressed his happiness that under the guidance of Hon'ble Prime Minister a new Act has been enacted and Commission for Air Quality Management has been set-up. After establishment of CAQM and with joint efforts made by all of us, there is 30% and 48% decrease in stubble burning cases in Punjab and Haryana, respectively last year, for which both the States deserve to be congratulated. Based on scientific data provided by ISRO, the stubble burning cases in Punjab have reduced from 71,304 to 49,922 and in Haryana these have reduced from 6987 to 3661. Also, the "Severe" air quality days in Delhi have reduced.

The Hon'ble Minister further said that the challenge is to convert this stubble waste into wealth by adding value addition. In Punjab, districts of Sangrur, Moga, Ferozepur, Ludhiana, Patiala, Barnala, Bathinda, Muktsar and Tarntarn are hotspots of stubble burning. Similarly, in Haryana, Districts of Karnal, Kaithal, Kurukshetra, Fatehabad, Jind and Sirsa are main areas of concern. One subject that both the State Governments have talked about is crop diversification and Haryana has experimented it on priority. The Central Government has given financial assistance of more than Rs. 3,000 crore for CRM machines during last 5 years including Rs. 1,347 crore to the State Government of Punjab. Earlier, we had issued advisories and directions in this regard in July / August, but now we have started preparations early and suggestions have been asked from stakeholders to make the efforts more successful.

The Hon'ble Minister appreciated the success stories shared by the stakeholders. By sharing information about success stories and by its adoption, zero stubble burning can be achieved in the near future. Though, directions have been issued mandating use of stubble in thermal power plants only about 6,800 tons of stubble was used in these plants. With strict implementation of the directions, about one million tonne of paddy stubble can be utilized in thermal power plants alone. One plant in Panipat, Haryana and one Plant in Bathinda, Punjab have the capacity to consume a total of about 4 lakh tonnes of paddy stubble per annum.

The total generation of stubble in the region is 29 million tonnes, out of which is 6 to 7 million tons is basmati stubble and management of remaining stubble is required to be done by sustainable means. CPCB has prepared a scheme to promote establishment of plants for manufacturing of pellets from paddy stubble. The CPCB will give cash subsidy of 40% to establish pellet plant of capacity 1 TPH having total cost of 70 Lakh. There is need to advertise this scheme at ground level.

The Hon'ble Minister requested both the State Governments, NGO's, social and religious groups, FPOs, entrepreneurs, industries and other stakeholders to collectively work for betterment of environment and set an example before the world by managing stubble generated in Punjab and Haryana by eliminating the practice of stubble burning in the region.

Open Interaction with NGOs, Social and Religious Groups, FPOs, Entrepreneurs, Industry Representatives etc.

Special Session of the workshop was followed by an open interactive session under the Chairmanship of Shri Bhupender Yadav, Hon'ble Minister, Environment, Forest and Climate Change (EFCC), wherein the stakeholders put their suggestions and views before the Hon'ble Minister. The suggestions given during the open interaction are summarized below: -

1. **Representative of Agriner Farmer Producer Organization:** Raised concern regarding higher maintenance and operational cost of briquetting machines in India. He requested to share the efforts made by the Government to extend the reach of such machines to the farmers and offered his expertise for development of new technology in this regard.
2. **Kheti Virasat Mission:** Suggested to deal the problem of water and *Parali* simultaneously and in totality by promoting the cultivation of millets, use of *Parali* in guashalas and preference for gram udyog based options over capital intensive solutions.
3. **Amritsar Hariaval NGO:** Need to frame proper mechanism for timely lifting of the *Parali* from the fields by extending awareness and by incentivizing local people who are already and actually working on such activities.
4. **Mr. Harpal Bajwa, Baler Operator and mushroom grower:** Raised the issue of non-lifting of the collected/stored *Parali* and suggested to mandate the installation of small boilers up to certain capacity exclusively on *Parali*.
5. **Lt. Col. (Retd.) Manish Ahuja, MD, PRESPL and Chairman Confederation of Biomass Energy Industries of India:** Raised the concerns regarding i) Capital inadequacy for post-harvest farming equipment; ii) Working capital availability; iii) Shortage of credit availability for funding farm agri-residues; iv) Capital inadequacy and

sought support of Government of India to address these issues to utilize *Parali*.

6. **Mr. Sameer Bhansali, CMD, ASAN Build:** Facilitation for the paddy straw as raw material and provision of subsidy.
7. **Mr. Vijay Sharan, Pelleting and Briquette Association, Haryana:** High maintenance cost of briquetting machines; introduction of certification of briquetting machines; pilot projects to demonstrate utilization of *Parali* in various applications.
8. **Mr. Dharam Sharma, Briquette Plant Owner, Haryana:** Raised working capital issues and suggested to cover the paddy straw management under MNREGA for controlling the raw material price and for ensuring sustainability of paddy straw utilization.
9. **Mr. J.C Sethi, Radha Swami Satsang Dera:** Suggested to address the problem at local levels as well, besides large-scale solutions already discussed in the workshop. He also highlighted efforts made by Radha Swami Satsang in this direction including use of straw in mulching, mattresses making, briquetting, internal fuel and preheating in brick making etc.
10. **Mr. Gurpreet, Reporter, Hindustan Times:** Raised query regarding deadline set for zero burning and efforts made by the Government to find the solution to the areas (Delhi, NCR, Haryana, Punjab) as a unified unit.
11. **Dr. Balwinder Singh:** Need to promote and prefer short duration varieties of paddy over PUSA variety.
12. **M/s Sukhbir Agro Energy Ltd.:** Shortage of *Parali* for Biomass plants in Haryana due to limited availability of Balers.
13. **Shri Ajit Rao, M/s Badshah Industries:** Provision of Lower Tariffs from Railways for transporting the pellets in the empty wagons of coal returning from the thermal Power plants of Punjab to other areas.

Hon'ble Minister, EFCC appreciated the suggestions given and appealed to all stakeholders for collective and co-ordinated efforts on a continuous basis to address the problem of paddy straw burning and to convert stubble to पूँजी (Wealth). He also appreciated the initiatives taken by CAQM to bring various stakeholders including Central Government, State Governments, Industry, Researchers, NGOs, FPOs and media on one platform to discuss this important issue in a very positive way. He also stressed the importance of taking the efforts to field level with the active cooperation of stakeholders so as achieve target of zero burning. Hon'ble Minister assured that Government of India will provide full support towards the collaborative endeavours towards eliminating the sustainable agricultural practice.

Important take-aways from the Workshop

1. There is a compelling need to substantially reduce *Parali* burning in the short term and eliminate this unsustainable practice in the medium term.
2. Promotion of short duration / early maturing paddy varieties to provide a larger window between the paddy harvest and Rabi crop sowing.
3. Total discontinuance of PUSA-44 variety.
4. Diversification to Basmati variety – adoption of Basmati varieties developed by IARI – PUSA 1121, 1401, 1509, 1692, 1897 etc. Improved export potential of Basmati.
5. Maximize direct seeding of rice (DSR) technique.
6. Campaigns, awareness programmes, IEC activities etc. need to be continuously carried out to educate farmers and other stakeholders about the ill effects of paddy stubble burning both on soil fertility / productivity and the concerns on air pollution and climate change in the long run.
7. Enhanced adoption of PUSA bio-decomposer in a complimentary mode along with other *in-situ* management techniques for paddy stubble. PUSA bio-decomposer is now available in a ‘ready to use’ powder form, which can be easily made a solution with water for spraying on the paddy fields post harvesting.
8. Leveraging the CRM Scheme of the MoAFW for procurement of appropriate farm machinery, based on the specific needs of farmers and identified clusters for *in-situ* / *ex-situ* management of paddy stubble.
9. Ensuring optimal utilization of the available farm machinery and implements towards *in-situ* management. Appropriate technology platforms / mobile applications need to be in place to facilitate booking of machines through CHCs / Co-operatives and monitoring their utilization.
10. A need has emerged to step up procurement of balers / rakers to facilitate *ex-situ* utilization of paddy straw as most districts in Punjab reported shortage of the same.
11. Mapping of villages / blocks / clusters for availability of paddy straw vis-à-vis demand in various *ex-situ* projects and applications.

12. Village panchayat land or other lands as identified by the State Government need to be earmarked to facilitate storage of large quantities of bailed paddy straw for subsequent processing and consumption round the year.
13. Adequate arrangements need to be made to control moisture content in the stored bales of paddy straw.
14. Considering large scale availability of paddy straw across almost all districts of Punjab and Haryana, there emerges a strong need to set up at least one briquetting / pelleting plant of adequate capacity at strategic locations in most districts in Punjab and Haryana.
15. State Governments need to ensure that their Thermal Power Plants located in NCR and adjoining areas co-fire mandated bio-mass in Thermal Power Plants.
16. Entrepreneurs / Organizations / Individuals may avail the benefits of a funding mechanism by CPCB for capital funding of about 40% of the total cost for such pelleting units.
17. A robust supply chain logistics mechanism covering both, i.e., supply and demand side needs to be put in place by State Governments to facilitate effective *ex-situ* utilization.
