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Dear Dr Rabindra Padaria

ICAR INTRODUCES HT RICE VARIETIES BY THE MUTAGENESIS PROCESS TOLERANT TO IMAZETHAPYR.

1. I am addressing you on the subject of your letter No. PS/JDE/619 dated 17 May 2024 announcing the introduction of ICAR's HT rice varieties¹ for commercial cultivation tolerant to Imazethapyr. It is understood that these HT varieties involve mutagenesis. We understand that the objective apparently is to scale its usage in DSR (direct seeding of rice). As increased weeds are often reported to be seen in DSR, imazethapyr (a broad spectrum herbicide) will be used as the weed killer of choice (without impacting the seed).

Mutagenesis involves genetic modification, but **NOT Genetic Engineering or GMOs**. This is in line with the EU Directive².

2. I, along with colleagues in civil society, working with farming groups across India, are agonised to know of this development. Your move highlights the consequences for India, that the ICAR, (India's regulatory body for farming) has effectively ditched its mandate to Indian Farmers and Farming, whose competitive advantage is **organic farming**, which is sustainable and regenerative. By avoiding synthetic pesticides and fertilisers, organic farms provide a safer habitat for a wide range of organisms, from soil microbes and insects to birds and mammals. The biodiversity provided by organic farms is crucial for ecosystem resilience and the provision

¹ <https://www.newindianexpress.com/nation/2024/May/22/new-icmr-basmati-rice-varieties-draw-criticism-from-environmentalists>

² <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32001L0018> Annex I B:

TECHNIQUES REFERRED TO IN ARTICLE 3 Techniques/methods of genetic modification yielding organisms to be excluded from the Directive, on the condition that they do not involve the use of recombinant nucleic acid molecules or genetically modified organisms other than those produced by one or more of the techniques/methods listed below are: (1) mutagenesis, (2) cell fusion (including protoplast fusion) of plant cells of organisms which can exchange genetic material through traditional breeding methods.

of ecosystem services such as water purification, pollination, and nutrient cycling, which benefit all species.

- **Therefore, this step is a potential threat to India's export markets, which are based on organic standards, along with the necessary co-surety that India's foods and farms are not contaminated by herbicides, a consequence of using HT crops. Up to now this has meant GE Ht crops, which are regulated under the 'Rules of 1989' covering GMOs and are under challenge in the Supreme Court in a PIL that goes back to 2005.**

3. HT Rice by mutagenesis: However, it is necessary that the entire mutagenesis process must be elaborated, especially when the mutant variety is for the purpose of human consumption. Notwithstanding the fact that HT is an unsustainable agricultural technology, along with the evidence of serious harm of HT crops provided in the paras that follow, the ICAR is duty-bound to provide for example, the following information with regard to HT mutant rice:

- (a) Whether a physical or a chemical mutagen was used; specify the mutagen
- (b) The method of treatment – whether dry seeds or germinating seeds or seedlings
- (c) The range of doses used and the LD (50) for the said material
- (d) The dose rates and in case of physical mutagen provide the estimation of the dose rate
- (e) The herbicide(s) used to test the HT of the basmati rice
- (f) The concentrations of the herbicides used
- (g) **The genetic mechanism by which HT rice through mutagenesis has a resistant gene to Imazethapyr.**
- (h) **The frequency of occurrence of HT mutants** along with lethal chlorophyll mutants and other viable mutants, which of course are not in focus
- (i) Whether the induced HT trait is dominant or recessive

4. The TEC Report: But, whether GE (GMO) or by mutagenesis, HT crops per se, have seriously deleterious impacts on farming. It may be noted that the Supreme Court-appointed Technical Expert Committee in its Report (2013-14), has a double bar on HT crops **(a)** for being an HT crop and **(b)** on account of contamination of crops in a centre of genetic diversity. So for example, HT DMH 11 is doubly barred by the TEC on both these grounds. India is a centre of diversity for Mustard and we have significant mustard diversity (NGPGR).

In the matter of rice, the matter is of the greatest concern because India is 'The Centre of Origin of rice', which means that India has an immensely rich diversity in rice. The ICAR has furthermore, and it must be said, rather perversely, selected Basmati, historically, the queen of rice varieties in which to introduce an HT trait. Therefore, ICAR's action directly impacts this vital issue of contaminating our germ plasm in rice and contravenes a Supreme Court Order of "no Contamination". Furthermore, our export markets for Basmati are in excess of US \$5 billion in 2023-24. Your action will also directly impact India's exports and thereby, impact farmer export potential, incomes and income opportunities that premium prices provide.

5. HT Crops, Evidence of harm (this evidence is in the Supreme Court) -- Devastating Environmental Impacts including Health: Based on empirical evidence of 35 years of planting HT crops in the US/Argentina, HT crops are a failed technology, which spawns super weeds, higher herbicide use and no added performance yield (Benbrook, Gurian-Sherman, multiple reports on super weeds and resistance. For India, HT crops are a particularly perverse use of technology, whether GE or through mutagenesis that risks small and marginal farmers' crops

and 'jari-booti' herbs and plants, used in many Ayurvedic medicines, because of herbicide drift among other serious impacts as follow:

- **Super weeds:** (as of about 2013) HT crops have caused the emergence of some 60 MILLION ACRES or about 25% of US cropland (TEC) of 'super' weeds resistant to herbicides, doubling since 2010 or about 50% of crop area sown to herbicides.
- **Costs to farmers** of weed control have increased by some estimates, by 100%, seed prices have gone up 3 times (from 1996).
- **US data of herbicide use:**

Overall herbicide use (US Geological Survey), has increased more than 10 fold, from 20 million pounds/year (prior to HT Crops (in 1992) to 280 million pounds/year by 2012 or 527million pounds more total herbicide was used in the US during this period (1992-2012) due to commercialised herbicide-resistant crops. The combined onslaught is putting US farmers out of business as they struggle with losses on a substantial scale.

- **HT crops are designed for monoculture.** They are completely unsuited to Indian small-holder farming that will harm small and marginal farmers' crops and 'jari-booti' herbs and plants, used in many Ayurvedic medicines, because of herbicide drift. It will also uniquely impact the employment of women in weeding (MS Swaminathan Task force 2004).
- **HT crops are pesticidal crops.** The toxicity of herbicides used in HT Crops means that they are pesticidal crops. Therefore, HT crops must be tested as pesticidal crops, but are not. The sprays include chemical and surfactants, the latter force both weeds and the HT crop to absorb significant quantities of the herbicide that is sprayed on them. The resistant crop stands. Everything else dies including non-target organisms.

NB: The genetic mechanism by which HT rice through mutagenesis has a resistant gene to Imazethapyr may please be clarified.

- **HT Crops will deny Indian farmers their niche export markets,** which are not contaminated and will be endangered by Herbicide (see earlier comment in para 2 above). Furthermore, the market for organics is growing by a robust minimum 20% pa. Both requirements attract premium prices
- **Roundup (Glyphosate): The IARC Report** (July 2015) (International Agency for Research on Cancer of the WHO): categorised Monsanto's 80% brand leader Glyphosate, (considered the safest herbicide in the world) as a "*Probable human carcinogen*" and "*sufficiently demonstrated for genotoxicity (damage to DNA) in animals*" (Group 2A, its second highest categorisation ref³. **California Law Suit finds Monsanto Guilty:** The IARC report findings include a linking of glyphosate to Non-Hodgkin's lymphoma. At the last reckoning there were more than 100,000 law suits winding their way through US Courts (includes some other countries as well).
- **In keeping with the above, Glyphosate** is an endocrine disruptor and causes birth defects; that as in the case of the tobacco lobby, which hid tobacco's link to lung cancer for 40 years, that similarly Monsanto, and the EPA, have both known for over 40 years that glyphosate and its formulations cause cancer.

³ SC doc [See ANNEX. P-1 TO P-5 | Add. Affidavit (14.09.2015)]

- **Toxicity Specific to Glufosinate Ammonium:** Ubiquitous Glyphosate used for over 40 years worldwide, is supposed to be the safest herbicide. **Glufosinate** is acknowledged as more toxic than glyphosate and like it, is a systemic, broad spectrum, non-selective herbicide (because it kills indiscriminately, soil organisms, beneficial insects etc). It is an acknowledged neurotoxin (causes nerve damage) and birth defects and is damaging to most plants that it comes into contact with. The US Environmental Protection Agency (US EPA) classifies glufosinate ammonium as '*persistent*' and '*mobile*'. Studies demonstrate that it causes adverse health effects in animal studies, is likely to leach into drinking water sources, could increase nitrate leaching, and is toxic to beneficial soil micro-organisms. The US EPA has stated that glufosinate is "*expected to adversely affect non-target terrestrial plant species*". It is banned in Europe and not permitted in India, under the Insecticide Act for mustard. It is an organophosphorus compound (toxic to biology), very similar in structure to glyphosate. Glufosinate "*has been clearly implicated in brain developmental abnormalities in animal studies and is very persistent in the environment, so it will certainly contaminate water supplies in addition to food where it will be absorbed. Also the chemicals in the formulation that will be sprayed are known to be toxic. As weeds become more resistant (they will eventually be resistant to all known herbicides)*". Bayer's data sheet confirms its status as a neurotoxin.

NB: Imazethapyr is also a systemic broad spectrum herbicide and is banned in some countries, and not approved for use in the EU. This is an additional red flag with regard to the use of this herbicide.

- **Antibiotic Resistance (Prof Jack Heinemann): Herbicides (including Imazethapyr) must be tested for their ability to cause bacterial antibiotic resistance: (ref.⁴): the main findings are:**

(a) Common adjuvants (e.g. emulsifiers/surfactants) used in association with herbicide active ingredients also altered the response of bacteria to antibiotics. A third study (Kurenbach et al. 2018) demonstrated that regardless of whether the exposure caused an increase in resistance or an increase in susceptibility to an antibiotic, exposure would always lead to populations of bacteria with mutations that made them resistant to antibiotics; **(b)** The initial response of the bacteria to herbicide-antibiotic exposures is what are commonly referred to as "*adaptive*". An adaptive response is one that is caused by a change in gene expression resulting from the exposure. That initial effect changed the effective dose of antibiotic **from ~2- to 6-fold**; **(c)** Within only 12 generations (which in some environments can be as little as a day or two), the biochemistry of resistance changed. The adaptive response was replaced by an acquired response, one based on mutation. Once this occurred, the effective dose of antibiotic could exceed clinical "break point", the highest safe concentration of an antibiotic for use in people (Kurenbach et al. 2018); **(d)** The evolution of antibiotic resistance was accelerated up to 100,000 times faster by herbicide exposures (Kurenbach et al. 2018); An acquired response can also include horizontal gene transfer. Herbicides and other agrichemicals can increase horizontal gene transfer (Liao et al. 2021; van Hamelsveld et al. 2023a); **(e)** The concentration of herbicidal active ingredient, adjuvant, or formulation

⁴ Document by Prof Jack Heinemann dated 30 June 2024 (enclosed)



needed to cause these effects on bacteria were at or below the recommended herbicide application rates, even for low concentration formulations sold to urban consumers (Kurenbach et al. 2017; Kurenbach et al. 2015); **(f)** Up to 90% of the antibiotic dose given to a person or animal is excreted in manure (Walpole et al. 2023). Therefore, herbicides are routinely applied to manure which contains potentially pathogenic bacteria and antibiotics; **(g)** Bacteria from farms can become airborne or move into waterways (Bai et al.2022; Sanz et al. 2021; van Hamelsveld et al. 2019). They may be inhaled or ingested, for example by the harvest of wild or cultivated foods (Berry et al.2015; van Hamelsveld et al. 2023b) where they can subsequently cause infections in people or companion animals; **(i)** commercial activities that increase the use of agrichemicals can have effects well beyond the agro-ecosystem, and even the food system. Our science is still discovering all the ways; **(j)** However, we already know that herbicides are among the most widely dispersed manufactured chemicals worldwide (Persson et al. 2022). Exposures are probable no matter where you live. The active ingredient glyphosate, the most commonly used herbicidal active ingredient in association with genetically modified crops, is routinely detected in people's urine (Ospina et al.2022);**(k)** Combined with antibiotic use in medicine, veterinary medicine, and crop protection, co-exposures to herbicide (and agrochemicals in general) and antibiotics are common. Co-exposures alter the response of bacteria, notably those that can cause diseases in people, companion animals, or livestock, to antibiotics. In time, the co-exposure increases resistance to antibiotics.

We (Jack H et al) recommend: *“it is necessary to test any herbicide, including of imazethapyr, to be able to exclude the possibility that it can cause antibiotic resistance. We have not identified any chemical or biological similarities between the herbicides that would allow one to predict in advance that a particular chemical or formulation would not have this effect on bacteria”* And *“that effects on bacteria that can cause disease be considered whenever considering adopting a cropping practice that combines herbicide use and herbicide tolerant crops. The enormous burden of antibiotic resistance should not be unnecessarily exacerbated by use of herbicides”.*

NB. India's population has some of the highest levels of antibiotic resistance in the world. Any spread of HT crops would put us at severe risk of resistance and disease.

6. Conflict of Interest: there is a serious and proven conflict of interest among our regulators, the Ministry of Science and Technology and the Ministry of Agriculture along with the Indian Council of Agricultural Research (ICAR), which promote GMOs in Indian agriculture. This evidence reflects the findings of the TEC Report (Technical Expert Committee) appointed by the Supreme Court (SC) in 2012 and two Parliamentary Standing Committees of 2012 and 2017.

In this context, I also address the MOU signed with Bayer last year (Sept 2023), which makes concrete the above long standing conflict of interest in the ICAR. Inking in ICAR's formal partnership with Bayer (Monsanto), quite simply confirms straightforwardly that the ICAR protects its interest, i.e. which is the same as those of Bayer-Monsanto, large Chemical/herbicide Corporates. Therefore, it is absolutely clear that the ICAR has ditched its mandate to Indian farmers and farming, which is, to promote farmer interests as a priority, in an unbiased and objective assessment of what is right and good for Indian farming and food, and for our population of 1 billion citizens. It also explains clearly, why the ICAR's decision to introduce an HT crop in rice varieties and basmati (a deliberate choice) by mutagenesis is off-


target, egregious and ethically wrong. The evidence provided above makes this conclusion entirely legitimate.

- **Therefore, I am constrained to ask: is it a deliberate decision of the ICAR to use the mutagenesis route, to produce HT rice varieties (tolerant to Imazethapyr), with the explicit objective, to by-pass the formal regulation of GE crops/GMOs?**

In view of the above evidence of serious irreversible harm to health, food & agriculture across several dimensions, and contravention of the PP (Precautionary Principle), it is a required scientific response for the ICAR to immediately withdraw HT rice varieties and desist from introducing any HT crop through mutagenesis.

Thank you

Yours Sincerely



Aruna Rodrigues
Lead Petitioner, GMO PIL for a moratorium on GE crops.

Cc

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