GM Mustard:

Facts against Myths
and
Some Critical Questions

Kapil Shah

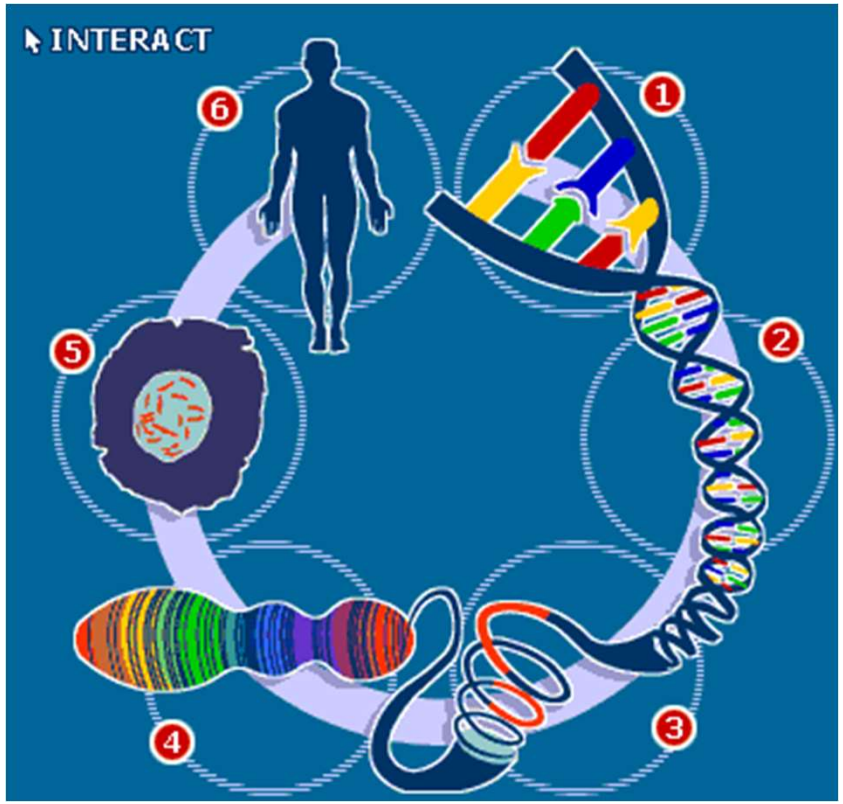
(M.Sc. In Plant Breeding and Genetics)

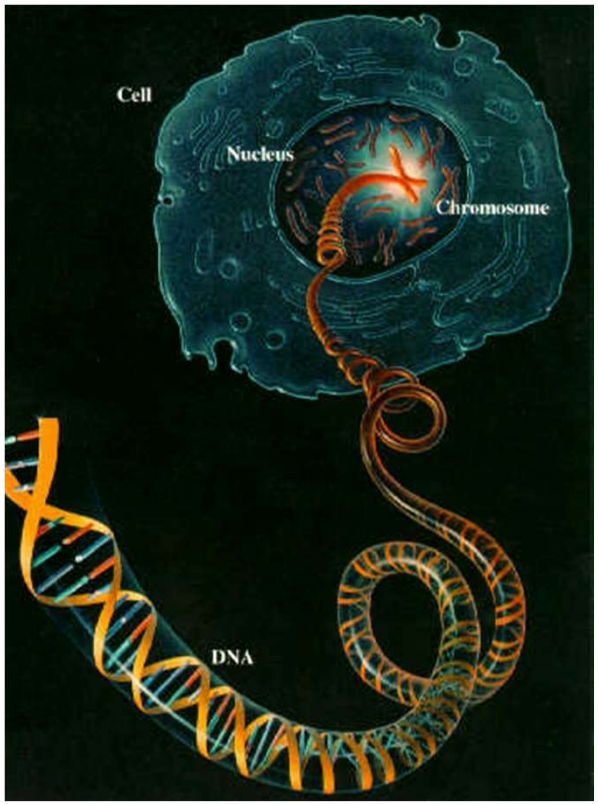
Alliance for Sustainable and Holistic Agriculture (ASHA)

Chandigadh, 16th Jan., 2023

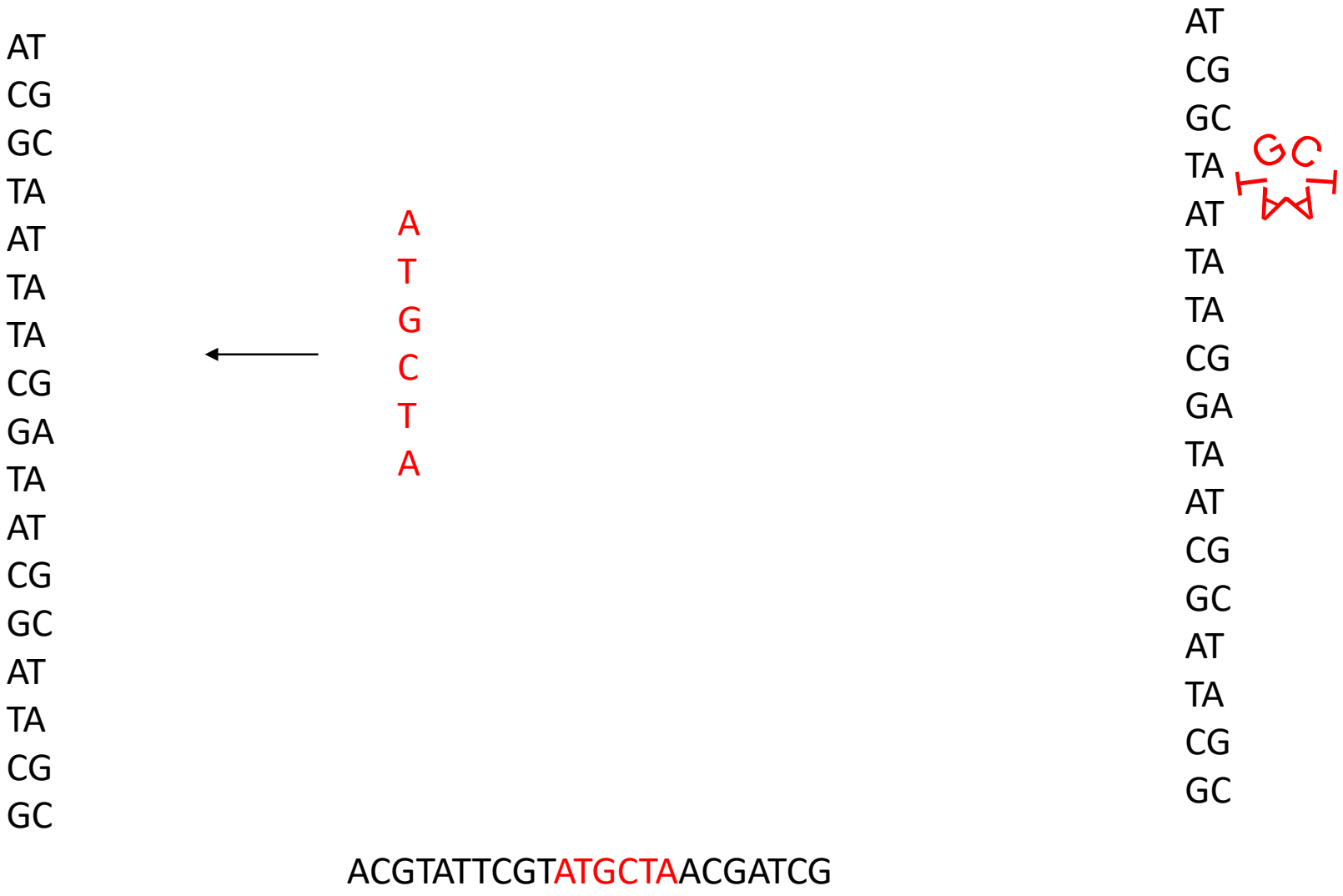
Size of the DNA of the all people of the world:
A Grain of chick pea

Length of the DNA of one person:
67 X 2 X Distance between Sun and Earth





Insertion imprecise



Nature of Transgenics

Self propagating / replicating through Reproduction

Irreversible changes

- Unlike pesticide or CFC Freeze, Transgenics can not be withdrawn.

Limitation of GE

- Extraction is precise, insertion is highly imprecise
- role of Genome is still to be known largely:

  e.g. only 3% of Human DNA is considered useful,

  Does it mean that if rest of the 97% is removed, the life will exist like without it?
- Translation from DNA to phenotypic character is not fully known

Imprecise Insertion → **Unknown Translation**

=Uncertain phenotypic changes

So, Precaution is Necessary

Myth-1: “GM Mustard Produces 26% More”

GoI affidavit in Supreme Court also confirms that yield claim is unproven


Business Standard

Saturday, January 14, 2023 | 05:01 PM IST English | Hind

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Potential of GM mustard yield untested, says DRMR director P K Rai

(https://www.business-standard.com/article/current-affairs/gm-mustard-yield-potential-untested-as-per-icar-rules-director-p-k-rai-122112000551_1.html)

“As far as DMH-11 is concerned, we are going to test it as IHT (initial hybrid trial). We are going to have a small trial and put all those checks…. This trial will be conducted at some of the centres… let us see whether it is qualifying for the next stage of promotion or not,” -Dr. P.K. Rai, DRMR

(https://indianexpress.com/article/india/gm-mustard-field-trials-to-begin-from-rabi-season-8241525/)

“the commercial release of the hybrid DMH 11 is subject to its testing and performance against the present day used check varieties/ hybrids in trials.”

– Dr. Himanshu Pathak, DG, ICAR

(https://www.pib.gov.in/PressReleasePage.aspx?PRID=1886080&fbclid=IwAR2Dg-nmHR_fgmeYIF76FtZm_cl11RQBQO3bOI-hPwppd7pdjR_4qqQancU)

Fact-1 : Yield Potential of GM mustard is not proven, it is a potential low yielder

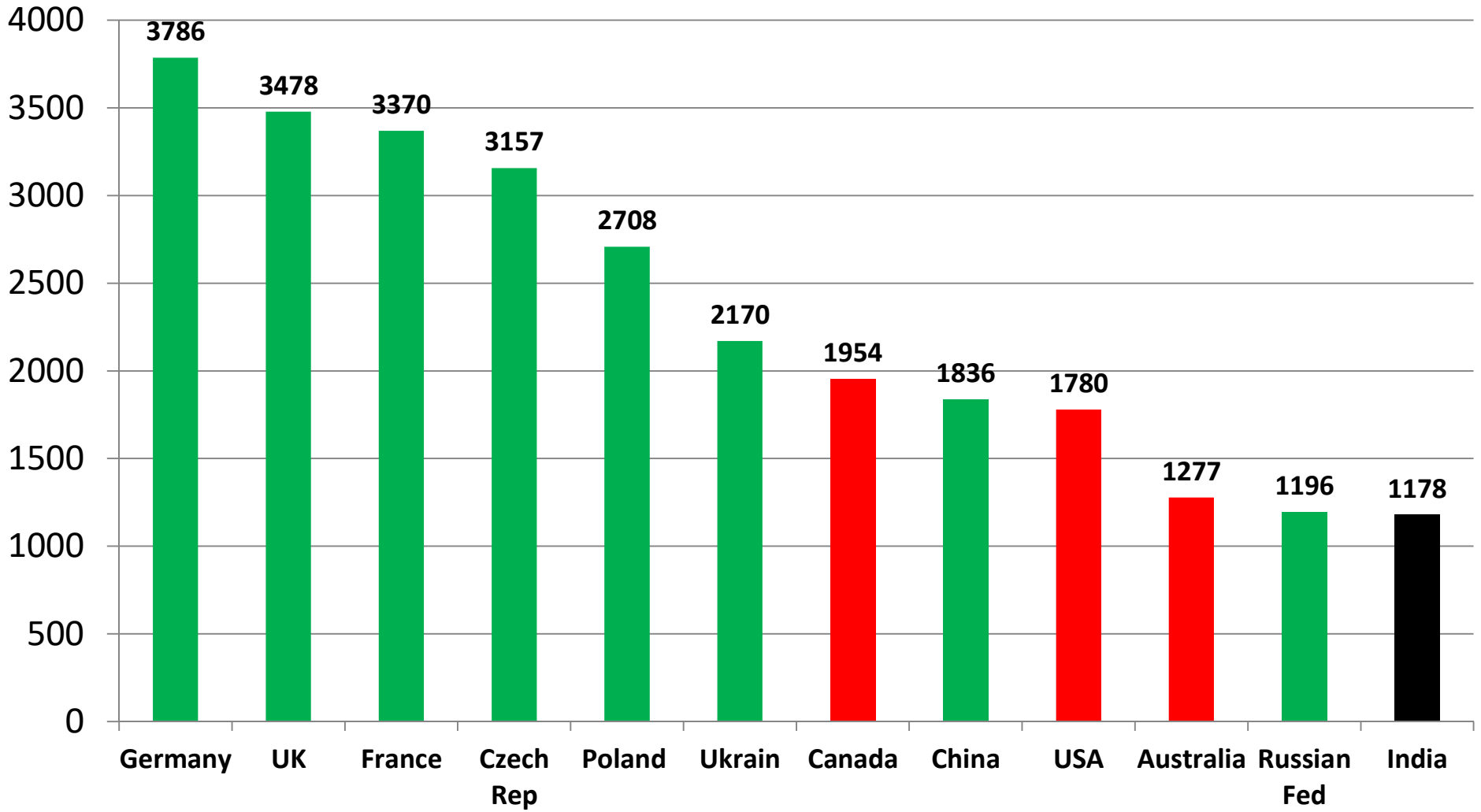
1000 seed weight and oil content (%) for Latest Releases, Checks and DMH-11

Varieties/hybrids	1000 seed weight (g)	Oil content (%)
RH 0749	6.9	39.2
DRMRIJ 31	4.9	40.0
NRCDR 2	5.2	40.1
DMH 1	3.9	39.9
NRCHB 506	4.5	39.9
Coral 437	4.0	39.7
DMH 11	**3.3**	40.2

AICRPRM- Reports

Yield is not the criteria, Early Heera-2 (the male parent with European genome) has smaller seed size and shattering character and so failure in adoption of DMH-1, DMH-2, DMH-4

Top Rapeseed Producing Countries
Average Yield (Kg./ha)-(2010-14)



RED coloured countries have opted for GM; **Top Yielders in Green are non –GM**

Source: FAO statistics: http://fenix.fao.org/faostat/beta/en/#data/QC

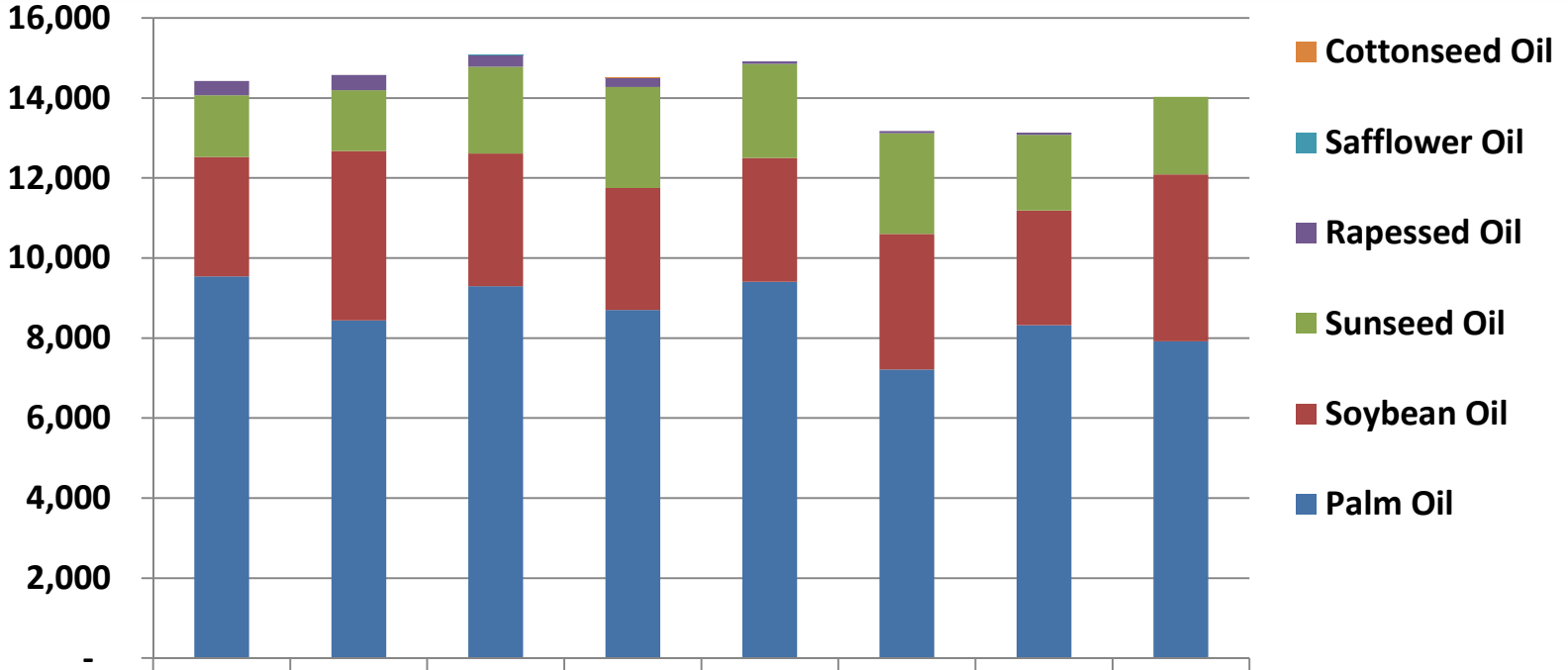
Myth-2: “GM mustard will reduce India’s edible oil import bill”

- One hybrid of one of the 7 major oil seed crops can not make significant impact on oil import. It has not made in the history. More than 40 varieties/hybrids released in last 10 years!
- If many years of (non-GM) hybrid mustard, with 45% of mustard land planted to hybrids, has not brought down edible oil imports, how can GM mustard hybrid lead to decline?
- In fact, being a low yielder, DMH-11 will reduce productivity
- India is self sufficient when it comes to Mustard Oil
- India’s edible oil demand is increasing because of food industry’s need for cheaper oils - Imported palm oil is 20 to 30% cheaper than other domestically produced oil.
- More production with the need to cater to cheaper oil demand means lower price to farmers. Does India really need to produce more (mustard) oil? If yes, who will bear the burden of cheaper oil produced domestically?
- Male sterility trait transfer and herbicide drift related losses will actually affect production!

Fact-2 : GM mustard will not reduce the edible oil import

Import of Edible Oil in India

(Thousand Tones)



	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Cottonseed Oil	-	-	-	3	-	-	-	-
Safflower Oil	-	-	6	-	-	-	-	-
Rapessed Oil	356	377	293	241	59	55	52	-
Sunseed Oil	1,542	1,516	2,169	2,525	2,351	2,519	1,894	1,944
Soybean Oil	2,986	4,235	3,316	3,047	3,094	3,384	2,866	4,171
Palm Oil	9,537	8,443	9,293	8,701	9,409	7,217	8,321	7,915

Source: https://seaofindia.com/import-of-vegetable-oils-nov-21-apr-22-up-by-4-but-apr-22-import-down-by-13/

Myth 3: “GM technology is needed to make hybrids or to exploit heterosis in mustard”

- Scientifically heterosis is related with combining ability of two parents and has nothing to do with pollination control technology
- Plenty of hybrids already developed and farmers are cultivating them without use of transgenics
- Indian mustard *(Brassica juncea)* is a natural hybrid, in fact and there is a in built limitation of heterosis
- Where the data to prove that transgenic male sterility is superior than naturally available cytoplasmic male sterility for pollination control to make hybrids and exploit heterosis?
- Tabulated data on seed set in bagged MS branches from Ludhiana indicate 7.43% breakdown of MS during BRL II trial. The Central Compliance Committee reported this in their note.

Theor Appl Genet (2006) 114:93–99
DOI 10.1007/s00122-006-0413-0

ORIGINAL PAPER

A new cytoplasmic male sterility system for hybrid seed production in Indian oilseed mustard *Brassica juncea*

Y. S. Sodhi · A. Chandra · J. K. Verma · N. Arumugam · A. Mukhopadhyay · V. Gupta · D. Pental · A. K. Pradhan

The male sterile lines were found to be stable for the trait under both long and short day conditions. CMS lines when crossed with lines other than the respective maintainer line were restored for fertility, implying that **any variety could act as a restorer for ‘126-1’ cytoplasm in *B. juncea*.** These unique features in maintenance and restoration of CMS lines coupled with near normal floral morphology of the CMS lines have allowed the use of ‘126-1’ cytoplasm for hybrid seed production.

Fact-3 : GM technology is not needed to make hybrids and exploit heterosis

Myth-4: "DMH-11 and its parental lines are not HT crops and so does not warrant testing as an HT crop"

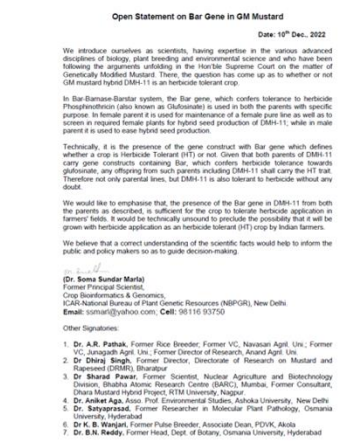
RESEARCH ARTICLE

Development of transgenics in Indian oilseed mustard (*Brassica juncea*) resistant to herbicide phosphinothricin

Smriti Mehra, Ashwani Pareek*, Panchali Bandyopadhyay, Pankaj Sharma†, Pradeep Kumar Burma and Deepak Pental**

Department of Genetics, University of Delhi South Campus, Benito Juarez Road, New Delhi 110 021, India
*Present address: Department of Biotechnology, Indraprastha University, Kashmere Gate, Delhi 110 007, India
†Present address: Department of Biotechnology, Cadila Pharmaceuticals Limited, 244, Ghodasar, Maninagar, Ahmedabad 380 050, India

Researcher of transgenic mustard has justified the need of HT mustard in India and claimed to have developed it in 2000



Open Statement on Bar Gene in GM Mustard

Date: 10th Dec., 2022

We introduce ourselves as scientists, having expertise in the various advanced disciplines of biology, plant breeding and environmental science and who have been following the arguments unfolding in the Hon'ble Supreme Court on the matter of Genetically Modified Mustard. There, the question has come up as to whether or not GM mustard hybrid DMH-11 is an herbicide tolerant crop.

In Bar-Barnase-Barstar system, the Bar gene, which confers tolerance to herbicide Phosphinothricin (also known as Glufosinate) is used in both the parents with specific purpose. In female parent it is used for maintenance of a female pure line as well as to screen in required female plants for hybrid seed production of DMH-11; while in male parent it is used to ease hybrid seed production.

Technically, it is the presence of the gene construct with Bar gene which defines whether a crop is Herbicide Tolerant (HT) or not. Given that both parents of DMH-11 carry gene constructs containing Bar, which confers herbicide tolerance towards glufosinate, any offspring from such parents including DMH-11 shall carry the HT trait. Therefore not only parental lines, but DMH-11 is also tolerant to herbicide without any doubt.

We would like to emphasise that, the presence of the Bar gene in DMH-11 from both the parents as described, is sufficient for the crop to tolerate herbicide application in farmers' fields. It would be technically unsound to preclude the possibility that it will be grown with herbicide application as an herbicide tolerant (HT) crop by Indian farmers.

We believe that a correct understanding of the scientific facts would help to inform the public and policy makers so as to guide decision-making.

(Dr. Soma Sundar Marla)
Former Principal Scientist,
Crop Bioinformatics & Genomics,
ICAR-National Bureau of Plant Genetic Resources (NBPGR), New Delhi.
Email: ssmarl@yahoo.com; Cell: 98116 93750

Other Signatories:

1. Dr. A.R. Pathak, Former Rice Breeder, Former VC, Navasari Agril. Un.; Former VC, Junagadh Agril. Un.; Former Director of Research, Anand Agril. Un.
2. Dr Dhiraj Singh, Former Director, Directorate of Research on Mustard and Rapeseed (DRMR), Bharatpur
3. Dr Sharad Pawar, Former Scientist, Nuclear Agriculture and Biotechnology Division, Bhabha Atomic Research Centre (BARC), Mumbai, Former Consultant, Dhara Mustard Hybrid Project, RTM University, Nagpur
4. Dr. Aniket Aga, Asso. Prof. Environmental Studies, Ashoka University, New Delhi
5. Dr. Satyaprasad, Former Researcher in Molecular Plant Pathology, Osmania University, Hyderabad
6. Dr K. B. Wanjari, Former Pulse Breeder, Associate Dean, PDVK, Akola
7. Dr. B.N. Reddy, Former Head, Dept. of Botany, Osmania University, Hyderabad

"Technically, it is the presence of the gene construct with Bar gene which defines whether a crop is Herbicide Tolerant (HT) or not. Given that both parents of DMH-11 carry gene constructs containing Bar, which confers herbicide tolerance towards glufosinate, any offspring from such parents including DMH-11 shall carry the HT trait. Therefore not only parental lines, but DMH-11 is also tolerant to herbicide without any doubt.

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– A group of Senior Scientists

Fact-4 : DMH-11 and its both the parents are HT by intent, genetic make up and phenotypic trait and needs to be tested as HT crop

PROS AND CONS OF HT CROPS

Short Term Benefits

- Labour costs reduced. May be good or huge farms of US, Brazil, Argentina etc
- Ease of spraying since all other plants die, except crop

Long Term Consequences

Consumer rejection, litigation shift in product choice

- Plant absorbs herbicide health damage
- Herbicide Resistant weeds – more weedicides, more cost.
- Non GM crops & organic permanent loss of opportunity
- Weeding income for poor destroyed

Other possible impacts

- Pollinators & pest controllers killed bees, ladybugs etc
- Herbicides create ecological deserts terrestrial & aquatic
- Conflict between farmers herbicide drift
- Loss of employment, especially for rural women

….Supreme Court's Technical Expert Committee Report

The TEC has examined the issues in relation to HT, particularly with regard to sustainability and the likely socioeconomic impact on major sections of rural society. On both these counts, based on the reasons presented in the section on Herbicide Tolerance, the conclusion of the TEC is that HT crops would most likely exert a highly adverse impact on sustainable agriculture, rural livelihoods, and environment. The TEC finds them completely unsuitable in the Indian context and

RECOMMENDS THAT FIELD TRIALS AND RELEASE OF HT CROPS NOT BE ALLOWED IN INDIA. (Page 71, Report of the majority 5 Independent Biosafety Experts of TEC, July 2013, along with the Corrigendum)

Myth-5: Parental lines do not warrant Bio-safety testing and so not done

- Two parental lines are two separate "events" and are not the same as the hybrid GM mustard which has been put through some limited testing – Parental lines did not undergo even this limited testing
- At least in China and Australia, parental lines are tested/approved separately – the applications and the regulatory processing is separate for the parental lines
- Both parents carry Bar genes and so carries HT trait

Fact-5 : Both the parents are independent event and warrant bio-safety testing including as HT lines

Myth-6: GM mustard is safe because GM canola is grown in foreign countries

- India is a signatory of Cartagena Protocol. Precautionary Principle is the cornerstone of this Agreement
- Indian Mustard (*Brassica juncea*) is a separate species than Canola
- Agro-climatic, social, cultural, economic conditions and agricultural practices are different, smaller farm sizes, most people depends on farming
- Consumption habits are different: Oil, leaves, flowers as human food, cake as feed and manure
- Cultivation has larger impact than consumption
- India is a Centre of Diversity
- If we just want to accept data from elsewhere, why have our own regulatory regime at all?

Fact-6 : On bio-safety can not be taken for granted quoting the cultivation in other country and of different species

Myth-7: GM mustard is Swadeshi and Swadeshi GM should be promoted

- The original Bar-Barnase-Barstar technology is not Swadeshi
- There is lack of clarity about original patents owned by Bayer's predecessor entities and all chances of exploitation later – Bikaneri Bt Cotton story repeating itself
- Patents on GM mustard – What is Swadeshi today can be assigned and sold tomorrow to big MNCs
- Swadeshi GM does not automatically mean SAFE GM?
- Delhi University itself already talking about need for private companies
- Monopolies and market centric approach is against the real spirit of Swadeshi, Best Swadeshi is empowering farmers to produce their own seeds, hand weeding,
- Opening the flood gates of GM crops:
  - Patented Seed Technologies: Arm twisting, court cases, Bt cotton case
  - Contaminations, Bt cotton Experience
  - Closing options for public sector, Indian companies
  - The nature of technology is such that gradually MNSc will capture the seed resource and market

Fact-7 : GM mustard is not Swadeshi, MNCs will capture the seed business in the long run. It is against the real spirit of Swadeshi

Myth-8: Contamination is not a matter of concern

- India is a Centre of Diversity
- According to NBPGR data, more than 12372 collections of Oil Seed Brassica in India. 388 accessions of *B. juncea* *(http://www.nbpgr.ernet.in)*
- Cotton germplasm already contaminated, reducing the options for future development
- HT character and MS character will spread to
  - Non- GM crops
  - Organic crops, compromising organic farming and status
  - Beyond the species

Fact-8 : Genetic contamination can not be stopped once GM mustard is released in the environment and it is matter of serious concern considering the research needs for future, rights of non-GM farmers and may impact foreign trade negatively.

Economic Impacts of GM Contamination

Over 400 registered cases, including from field trials.

HUGE LOSSES as Europe, Japan, Korea etc cancel contracts :

- **Rice : US trial rice - loss of $ 1 billion . Bayer paid $750 mn**
- **Wheat : Millions lost as 'destroyed' GM trial wheat reappeared**
- **Maize: Estimated loss $ 90 million pa to US organic maize.**
- **Flax: Canadian trial flax caused major loss of business.**
- **Canola : 80% of wild canola plants' gene pool contaminated**
- **Oilseed Rape: almost 100% contaminated in Canada**
- **Papaya: 30% fall in Hawaiian production**

INDIA :

Priceless germplasm at risk in University based trials. (Dharwad Univ)

Organic cotton exports fell due to GM contamination

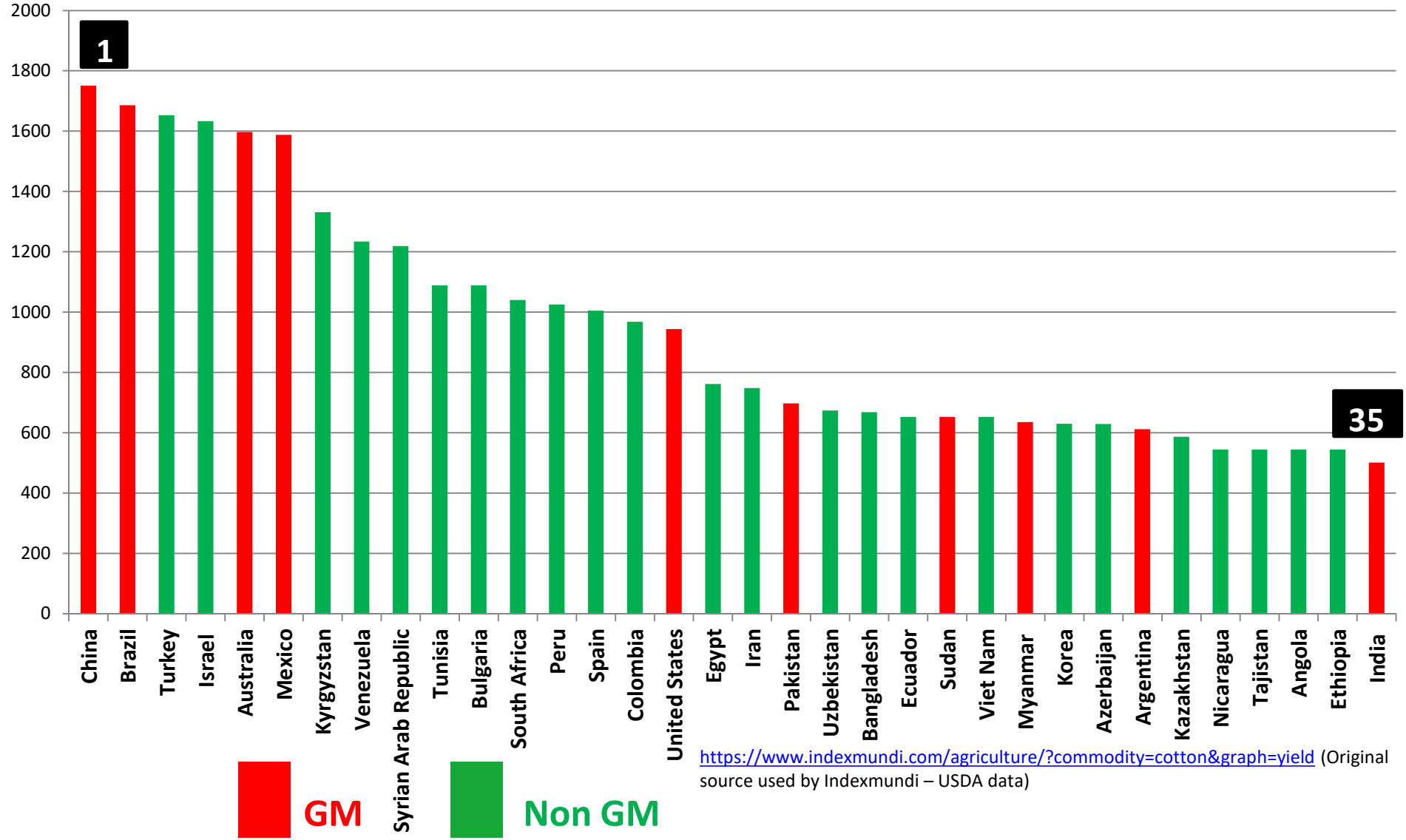
Myth-9: GM crops are inevitable for to increase the yield.

It is globally accepted technology and the ONLY saviour

Global Cotton Yields - in Kg/ha (Index Mundi 2019)

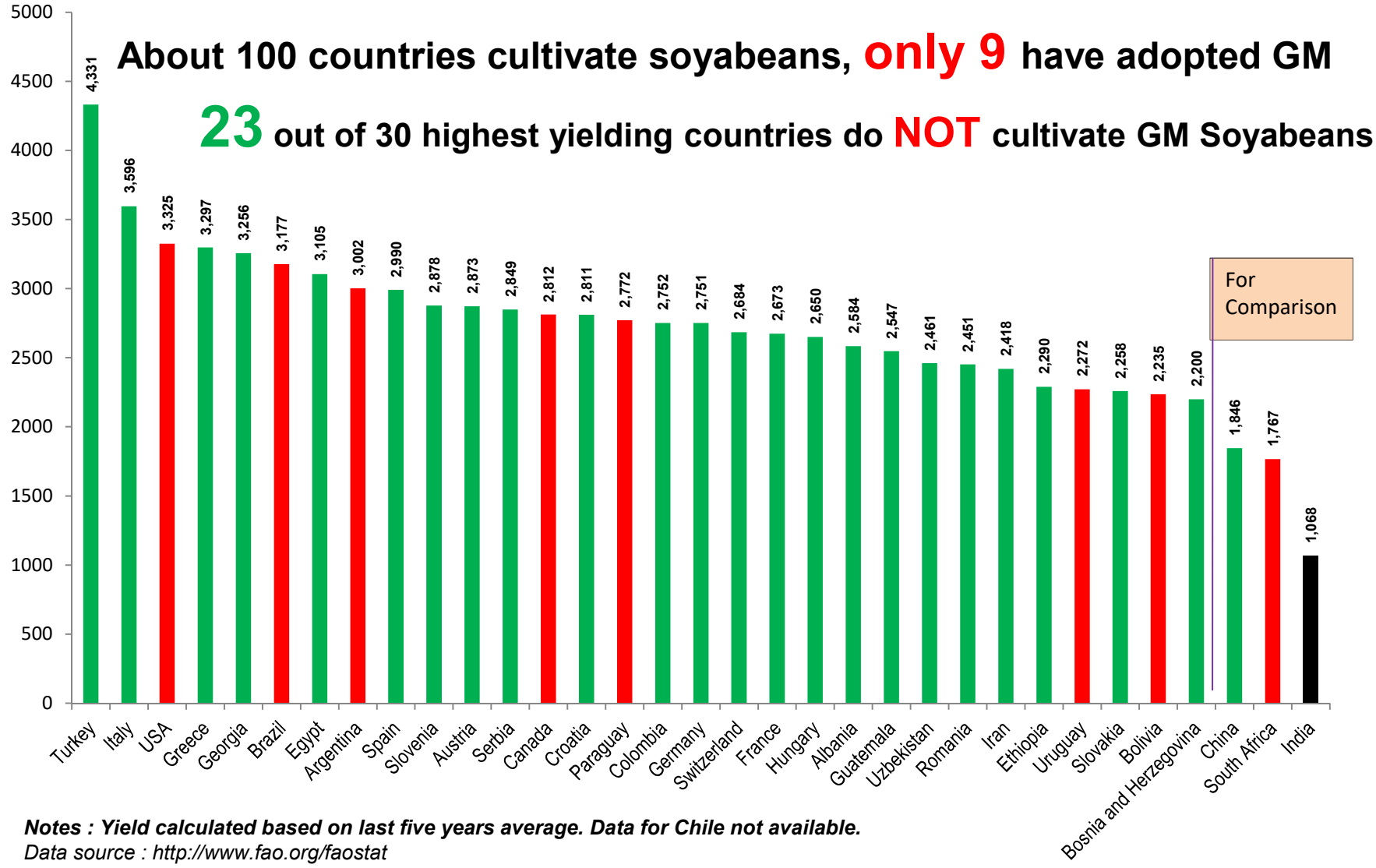
After 17 years OF Bt COTTON, India ranks 35th out of 72

24 countries ahead of India do not grow Bt cotton



https://www.indexmundi.com/agriculture/?commodity=cotton&graph=yield (Original source used by Indexmundi – USDA data)

Comparing Yield of Top 30 Countries having highest productivity of Soyabeans (Kg/ha)



Notes : Yield calculated based on last five years average. Data for Chile not available.

Data source : http://www.fao.org/faostat

The Myth of Higher Yields

International Journal of Agricultural Sustainability, 2014
Vol. 12, No. 1, 71–88, http://dx.doi.org/10.1080/14735903.2013.806408

Routledge
Taylor & Francis Group

Sustainability and innovation in staple crop production in the US Midwest

Jack A. Heinemann[a,b*], Melanie Massaro[b,c], Dorien S. Coray[a,b], Sarah Zanon Agapito-Tenfen[b,d] and Jiajun Dale Wen[e]

[a]*School of Biological Sciences, University of Canterbury, Christchurch, New Zealand;* [b]*Centre for Integrated Research in Biosafety, University of Canterbury, Christchurch, New Zealand;* [c]*School of Environmental Sciences, Charles Sturt University, Albury, NSW, Australia;* [d]*Crop Science Department, Federal University of Santa Catarina, Florianópolis, Brazil;* [e]*Third World Network, Kuala Lumpur, Malaysia*

A **2013** peer-reviewed paper looked at crop production data from the United Nations' Food and Agriculture Organisation (FAO) and found that for staple crops, Western Europe's almost entirely **non-GM agriculture out-yielded** North America's GM agriculture, with less pesticide use.

Ref: https://www.gmwatch.org/en/news/latest-news/19591-genetic-engineering-continues-to-fail-to-increase-crop-yields

The Myth of Higher Yields

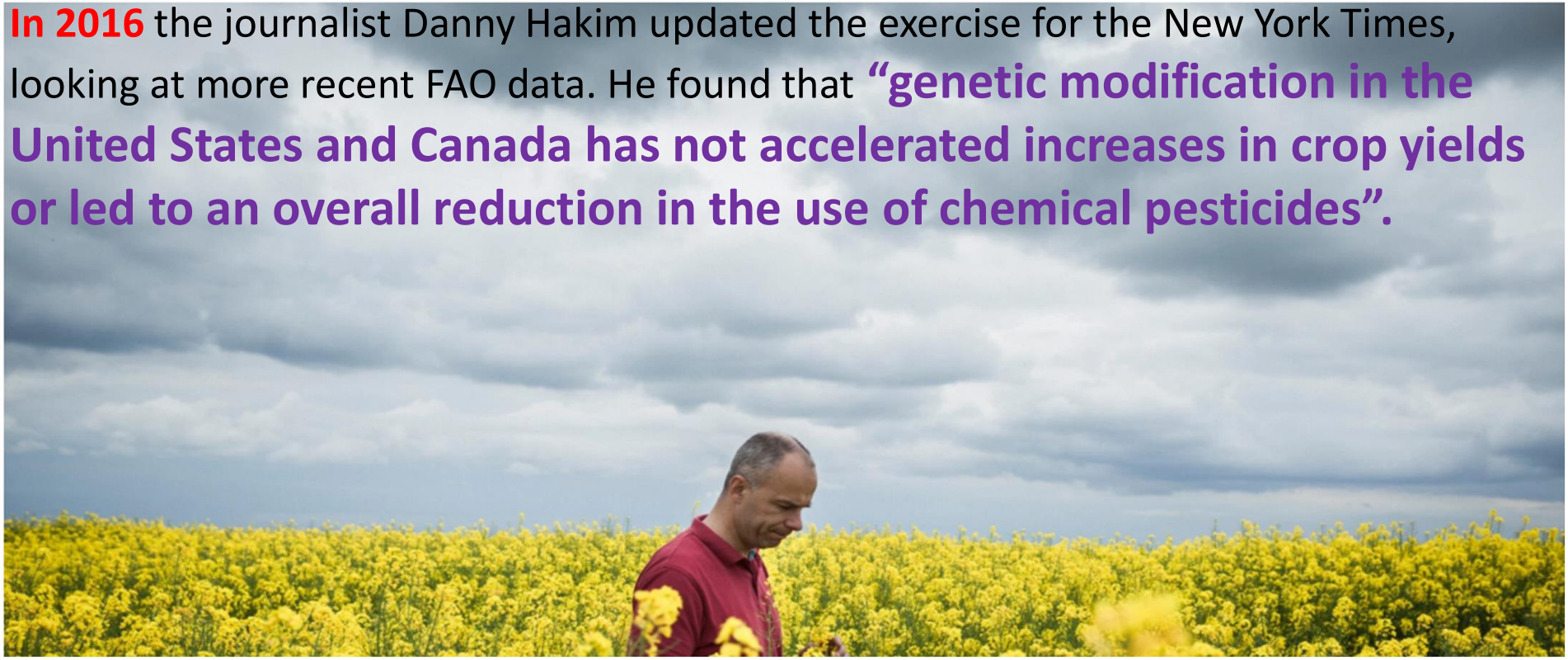
BUSINESS

The New York Times

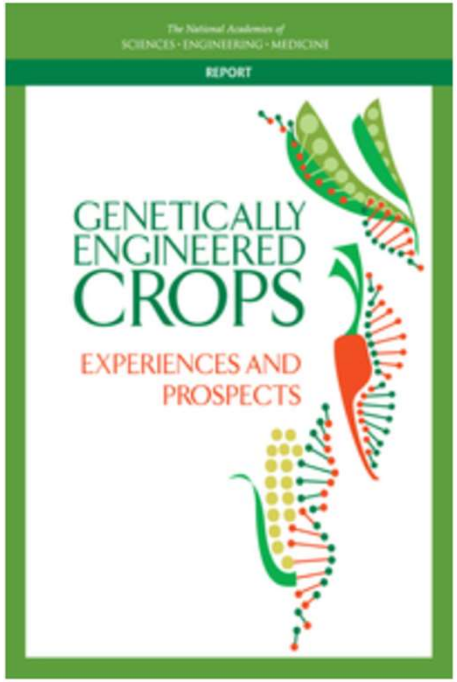
UNCERTAIN HARVEST

Doubts About the Promised Bounty of Genetically Modified Crops

In 2016 the journalist Danny Hakim updated the exercise for the New York Times, looking at more recent FAO data. He found that **"genetic modification in the United States and Canada has not accelerated increases in crop yields or led to an overall reduction in the use of chemical pesticides".**



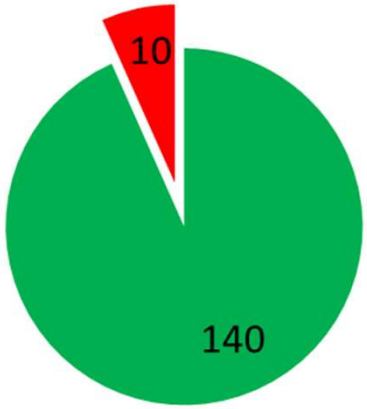
The Myth of Higher Yields



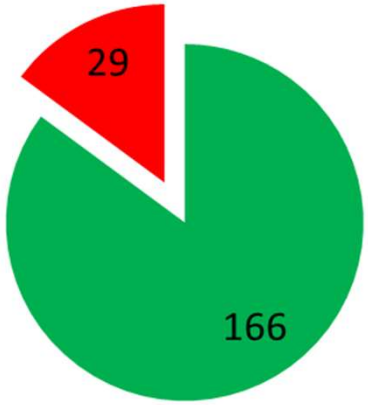
"there was little evidence" that the introduction of GM crops in the United States had led to yield gains beyond those seen in conventional crops.

Ref: https://www.nationalacademies.org/our-work/genetically-engineered-crops-past-experience-and-future-prospects

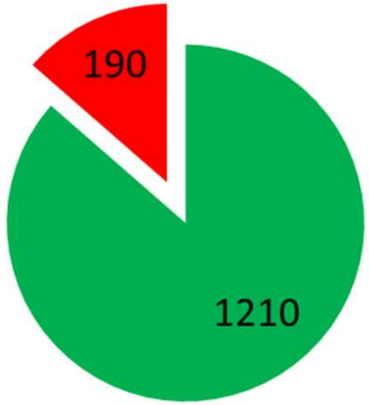
Myth: It is Globally Adopted Technology?



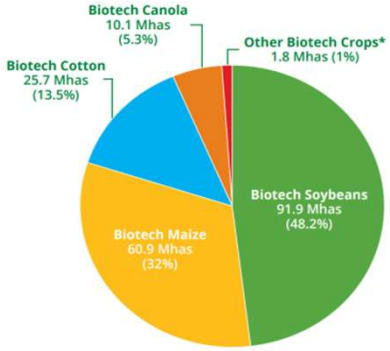
Crops
10/150 (6.6%)
4 crops covers
99% of the Area



Countries
29/195 (1.5%)
5 countries coves
91% of the Area



Area (in mil. Ha)
190/1400 (1.4%)



** Biotech sugar beets, potatoes, apples, squash, papaya, and brinjal/ eggplant.*

BIOTECH CROPS IN 2019 (AREA AND ADOPTION RATE)

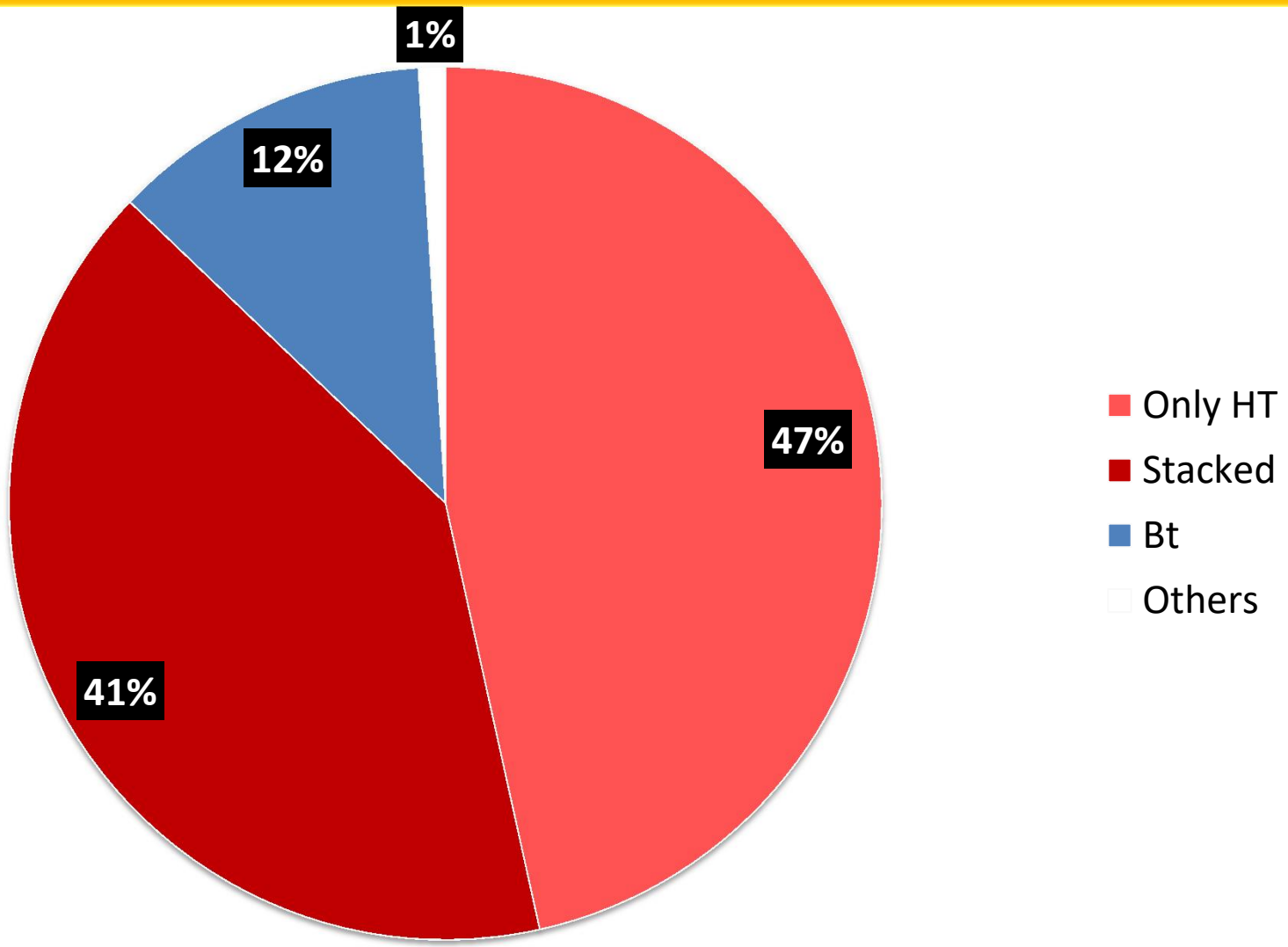
Rank	Country	Area (Million Hectares)	Biotech Crops
1	USA*	71.5	Maize, soybeans, cotton, alfalfa, canola, sugar beets, potatoes, papaya, squash, apples
2	Brazil*	52.8	Soybeans, maize, cotton, sugarcane
3	Argentina*	24.0	Soybeans, maize, cotton, alfalfa
4	Canada*	12.5	Canola, soybeans, maize, sugar beets, alfalfa, potatoes
5	India*	11.9	Cotton
6	Paraguay*	4.1	Soybeans, maize, cotton
7	China*	3.2	Cotton, papaya
8	South Africa*	2.7	Maize, soybeans, cotton
9	Pakistan*	2.5	Cotton
10	Bolivia*	1.4	Soybeans
11	Uruguay*	1.2	Soybeans, maize
12	Philippines*	0.9	Maize
13	Australia*	0.6	Cotton, canola, safflower
14	Myanmar*	0.3	Cotton
15	Sudan*	0.2	Cotton
16	Mexico*	0.2	Cotton
17	Spain*	0.1	Maize
18	Colombia*	0.1	Maize, cotton
19	Vietnam*	0.1	Maize
20	Honduras*	<0.1	Maize
21	Chile	<0.1	Maize, canola
22	Malawi	<0.1	Cotton
23	Portugal	<0.1	Maize
24	Indonesia	<0.1	Sugarcane
25	Bangladesh	<0.1	Brinjal/Eggplant
26	Nigeria	<0.1	Cotton
27	Eswatini	<0.1	Cotton
28	Ethiopia	<0.1	Cotton
29	Costa Rica	<0.1	Cotton, pineapple
	Total	190.4	

*19 biotech mega-countries grew 50 hectares or more of biotech crops.
**Rounded-off to the nearest hundred thousand.

– a slight decline of 1.3 million hectares (3.2 million acres) or 0.7% from 191.7 million hectares in 2018.

Source: https://www.isaaa.org/resources/publications/briefs/55/executivesummary/pdf/B55-ExecSum-English.pdf

Only 2 traits in 99% of GM Crops. Both increase toxins in food.



Source: ISAAA Briefs -53 (Global Status of Commercial biotech /GM crops: 2017
https://www.isaaa.org/resources/publications/briefs/53/download/isaaa-brief-53-2017.pdf

Globally GM Not Increased Yields or Food Security

YIELDS: US Dept of Agriculture Report of 2014 states:

"Over the first 15 years of commercial use, GE seeds have not been shown to increase yield potentials of the varieties."

https://www.ers.usda.gov/webdocs/publications/45179/43668_err162.pdf

FOOD INSECURITY: No link with GM. In USA food insecurity has not improved after GM, from 12% in 1995 to 12% in 2018. (US Department of Agriculture)

https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/key-statistics-graphics.aspx
https://www.fns.usda.gov/household-food-security-united-states-1995-summary-report-food-security-measurement-project

GM - Initially rapid growth. Now stagnating/Lowering

ORGANIC - Is fastest growing technology:

Estimated demand growth is >25% pa

USA organic food growth is >10% pa

SOURCES : ISAAA GLOBAL STATUS REPORTS, IFOAM REPORT and GMO MYTHS AND TRUTHS

Myth-10: GM mustard is inevitable to increase the yield of Mustard

- Well-performing non-GM Varieties and Hybrids already released – take them to farmers – improve farmer-controlled seed systems for the same
- System of Mustard Intensification:30 to 50%
- Seed Drill
- Seed Treatment

Fact-10 : Mustard yield can be increased without GM technology

Need Assessment

"transgenics should be resorted to when other options to achieve the desired objectives are either not available or not feasible."

-Task Force report, accepted by the Agriculture Ministry in 2004

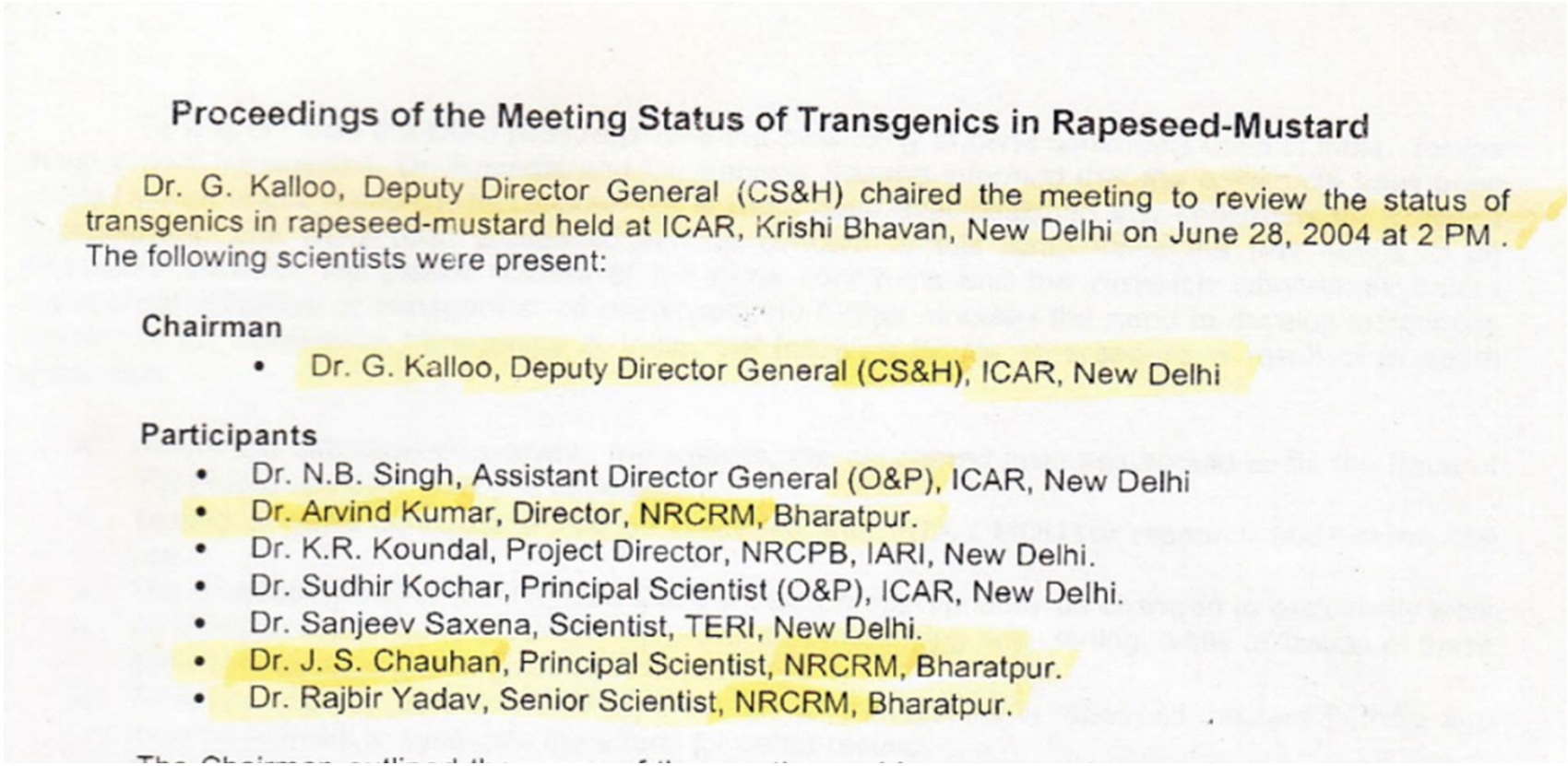
- **Bt. Brinjal:**

  AAU has developed NPM package for FSB of Brinjal.

  Bt. Rice:

  Incidence of Lepidopteron insect viz Stem Borer & Leaf Folder Infestation is being monitored since 1973 across the Gujarat State by Research Scientist (Rice) shows Low Infestation in the state.

Is GM mustard Needed?



Proceedings of the Meeting Status of Transgenics in Rapeseed-Mustard

Dr. G. Kalloo, Deputy Director General (CS&H) chaired the meeting to review the status of transgenics in rapeseed-mustard held at ICAR, Krishi Bhavan, New Delhi on June 28, 2004 at 2 PM . The following scientists were present:

Chairman

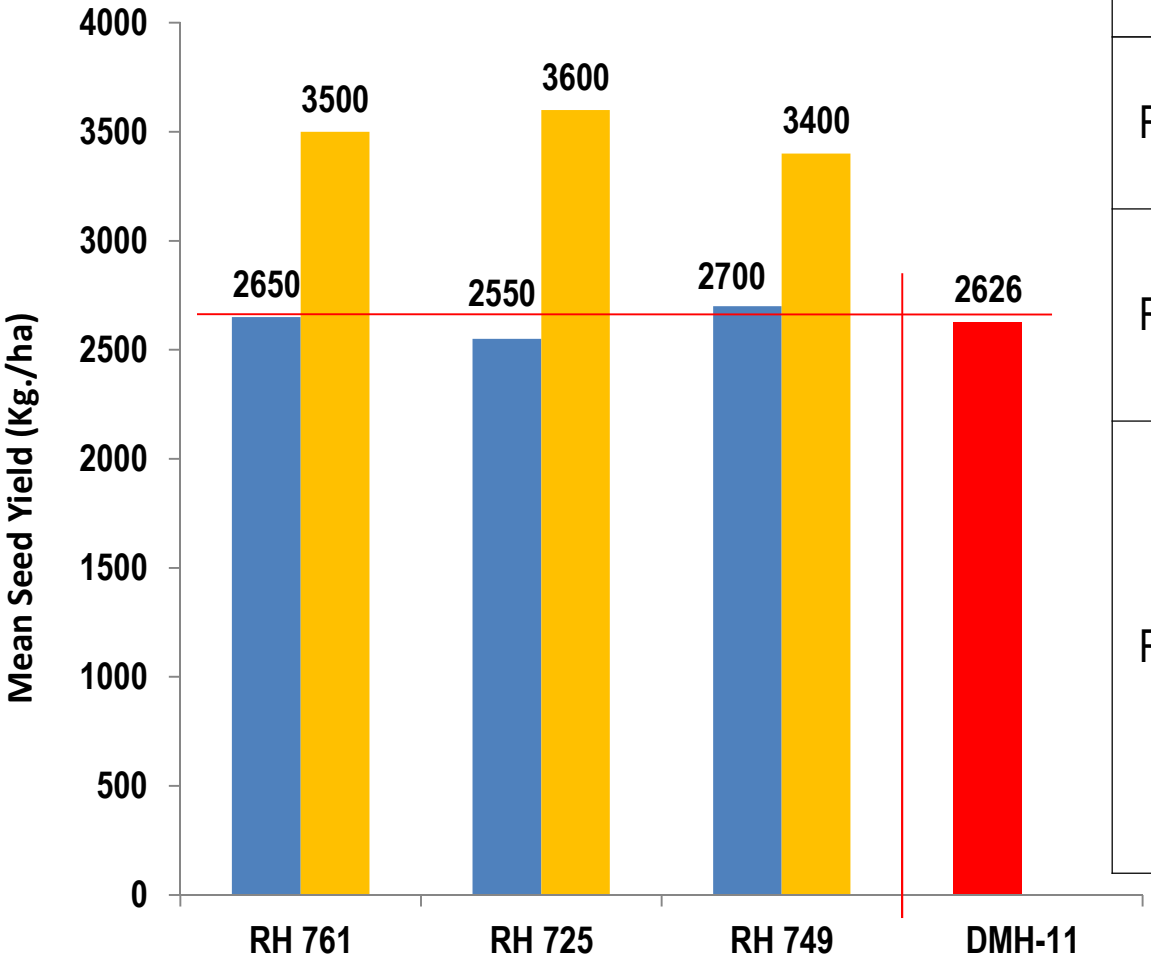
- Dr. G. Kalloo, Deputy Director General (CS&H), ICAR, New Delhi

Participants

- Dr. N.B. Singh, Assistant Director General (O&P), ICAR, New Delhi
- Dr. Arvind Kumar, Director, NRCRM, Bharatpur.
- Dr. K.R. Koundal, Project Director, NRCPB, IARI, New Delhi.
- Dr. Sudhir Kochar, Principal Scientist (O&P), ICAR, New Delhi.
- Dr. Sanjeev Saxena, Scientist, TERI, New Delhi.
- Dr. J. S. Chauhan, Principal Scientist, NRCRM, Bharatpur.
- Dr. Rajbir Yadav, Senior Scientist, NRCRM, Bharatpur.

"Since the workable three line system of hybrid development (A,B,and R lines) is presently available, therefore, there is no need for the transgenics for hybrid development in Mustard."

Latest Release of Mustard Varities by HAU, Hissar

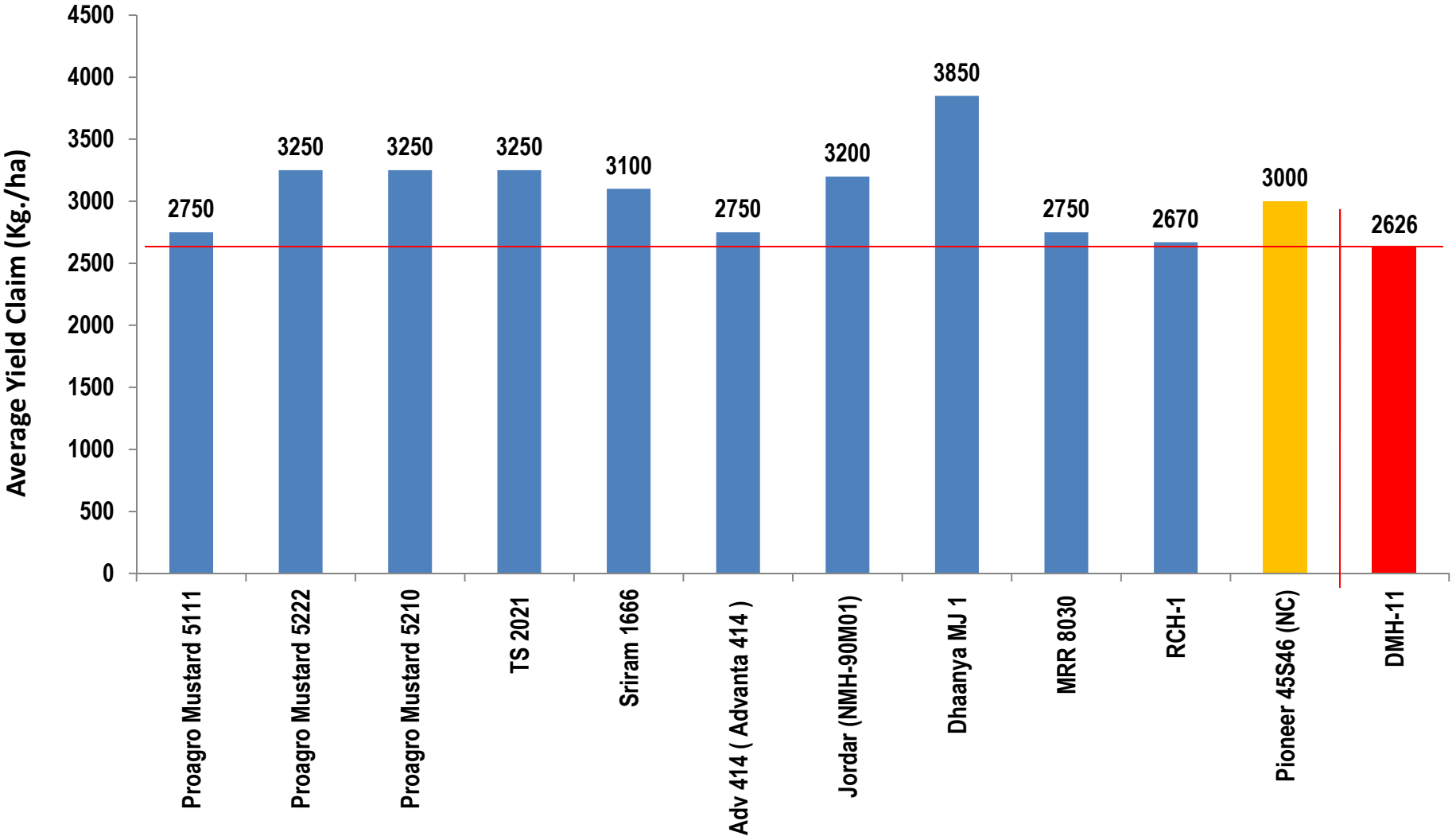


Variety/ Hybrid	Year of Release	Area
RH 761	2019	National (Haryana, Punjab, Delhi, Jammu & Northern Rajasthan) for timely sown and rainfed conditions
RH 725	2018	
RH 749	2013	National (Haryana, Punjab, Delhi, Jammu & parts of Rajasthan) for timely sown and irrigated conditions

Source : https://hau.ac.in/public/notification-documents/1931/1621839815.pdf
For Transgenic Hybrid : Assessment of Food & Environmental Safety (AFES) for Environmental Release of GE Mustard Page No. 102

Mustard Hybrids Presently Cultivated by Farmers

(It is estimated that 45% of the Mustard Area is under Hybrid)



Source : Data for RCH-1 from PAU website. Data for Other Hybrids is based on farmers experiences and promoters' claims.
For Transgenic Hybrid : Assessment of Food & Environmental Safety (AFES) for Environmental Release of GE Mustard Page No. 102

Myth-11: Only handful of activists oppose GM crops

- Public Consultations will reveal the truth: Bt Brinjal as an example
- State Govts
- Scientists: Gag Order of ICAR is a proof
- Judges
- Medicos
- APMCs
- Farm Leaders
- Consumers
- Civil Society Groups: SJM, Honey producers, SEA?
- In fact, handful of techno-bureaucrats, a few scientists and GM lobby promote GM crops for obvious reasons and succumb to international pressure especially from corporate lobbies and USA

Fact-11 : Most people of India oppose GM crops/ foods

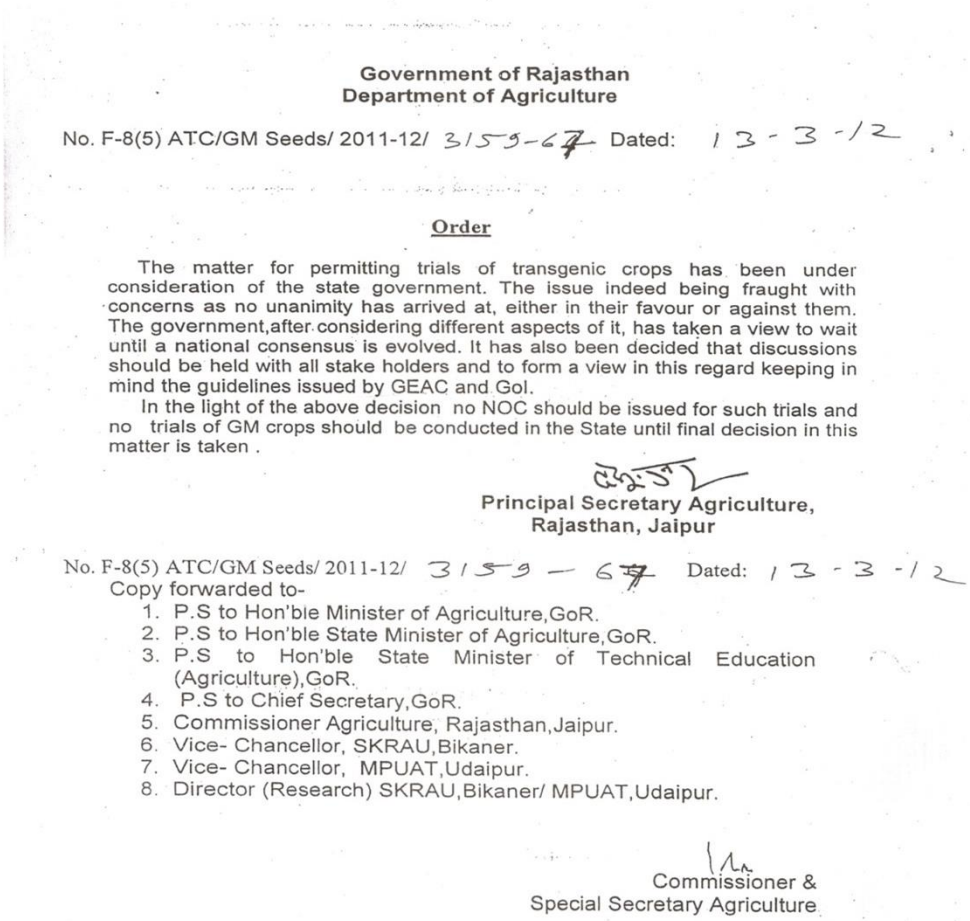
INDIANS HAVE REPEATEDLY REJECTED GM CROPS.

- **Bt Brinjal stopped.**
- **57 Farmer Unions, Assocn of 5 lakh Beekeepers, oppose GM mustard.**
- **2 Parliamentary Standing Committees' Unanimous Reports, indict GM and regulators. Technical Expert Committee of SC against HT.**

On March 9th, the NOC was withdrawn and the crop ordered to be destroyed

-**Anil Gupta,**

Deputy secretary, Department of agriculture



Government of Rajasthan
Department of Agriculture

No. F-8(5) ATC/GM Seeds/ 2011-12/ 3159-67 Dated: 13-3-12

Order

The matter for permitting trials of transgenic crops has been under consideration of the state government. The issue indeed being fraught with concerns as no unanimity has arrived at, either in their favour or against them. The government,after considering different aspects of it, has taken a view to wait until a national consensus is evolved. It has also been decided that discussions should be held with all stake holders and to form a view in this regard keeping in mind the guidelines issued by GEAC and GoI.

In the light of the above decision no NOC should be issued for such trials and no trials of GM crops should be conducted in the State until final decision in this matter is taken .

Principal Secretary Agriculture,
Rajasthan, Jaipur

No. F-8(5) ATC/GM Seeds/ 2011-12/ 3159 – 67 Dated: 13-3-12

Copy forwarded to-

1. P.S to Hon'ble Minister of Agriculture,GoR.
2. P.S to Hon'ble State Minister of Agriculture,GoR.
3. P.S to Hon'ble State Minister of Technical Education (Agriculture),GoR.
4. P.S to Chief Secretary,GoR.
5. Commissioner Agriculture, Rajasthan,Jaipur.
6. Vice- Chancellor, SKRAU,Bikaner.
7. Vice- Chancellor, MPUAT,Udaipur.
8. Director (Research) SKRAU,Bikaner/ MPUAT,Udaipur.

Commissioner &
Special Secretary Agriculture

Govt. Bans GM trials in Rajasthan

Other Concerns

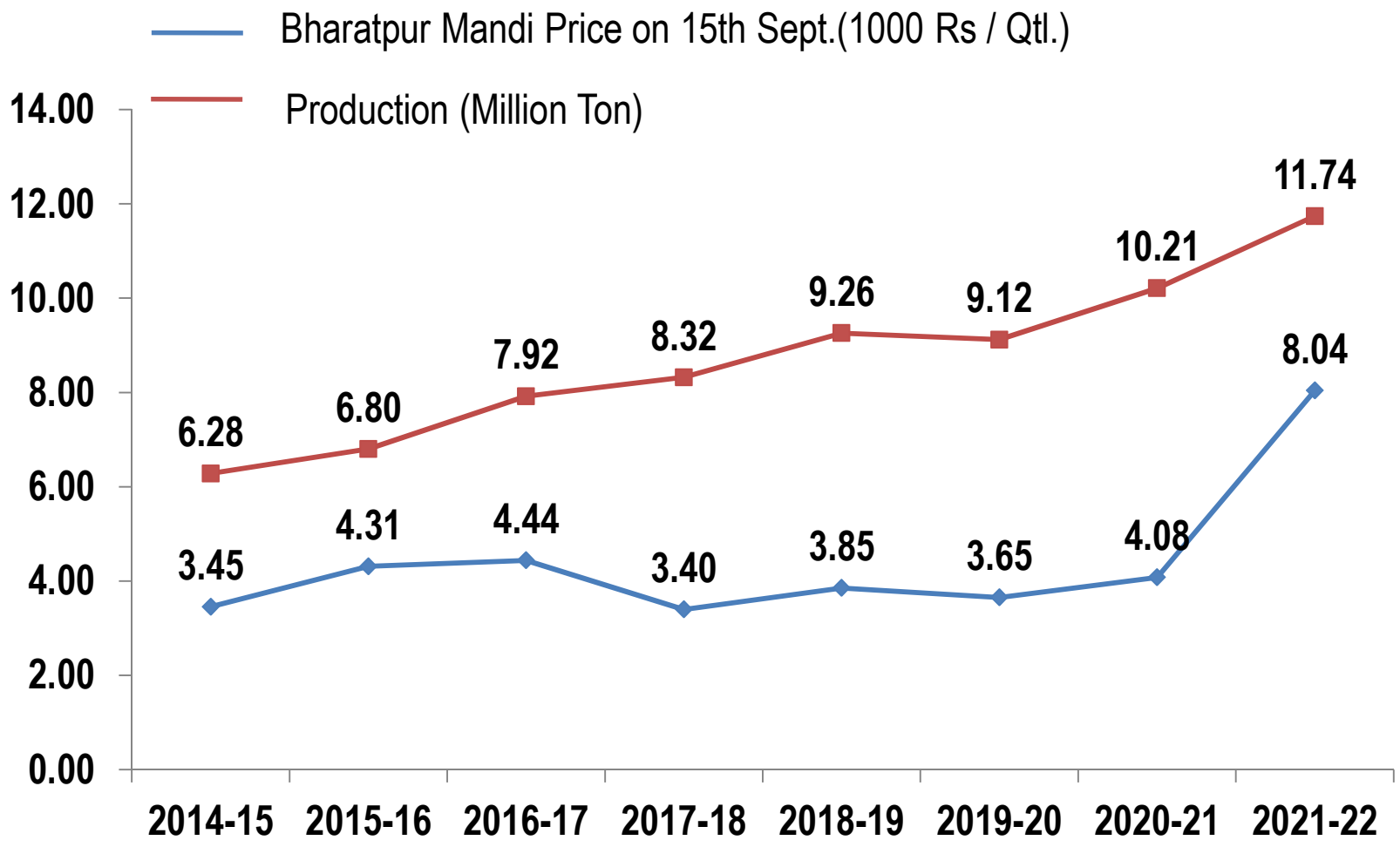
- Limited **seed choices** for farmers
- Promotes monoculture at various levels
- **Contamination** at various levels: pollen, seeds, grains, meal
- **IPRs and Monopolies eg. Potato farmers sued in Gujarat**
- Impact on **other industry**, eg. Honey Industry
- **Health of animals, especially poultry; evidence exists**
- **Possibilities of residues** in animal products
- Limited choices/ Confusions for end consumers, **labelling?**
- **Poor monitoring and regulation** in India
- **Safer and sustainable ways** to solve the problem are **ignored.**

How to make India Self Sufficient in Edible Oil

- Earlier experience
- Self Sufficiency: Not only Produce more, but also Consume Less
- Efforts to reduce consumption are missing.
- Recommended Fat and Oil Consumption: For Moderately active adult man: 30 g/day and for adult woman: 25 g/day. Average: 10.5 Kg/Year (https://www.nin.res.in/RDA_short_Report_2020.html).
- Indian consumes 14.2 (19?) Kg./year/head (40% more than recommended inviting health problems especially obesity and cardiac problems
- Production is function of
  - potential of the variety,
  - agro-climatic condition including rainfall, diseases and pest attacks,
  - acreage
  - availability of irrigation water etc.

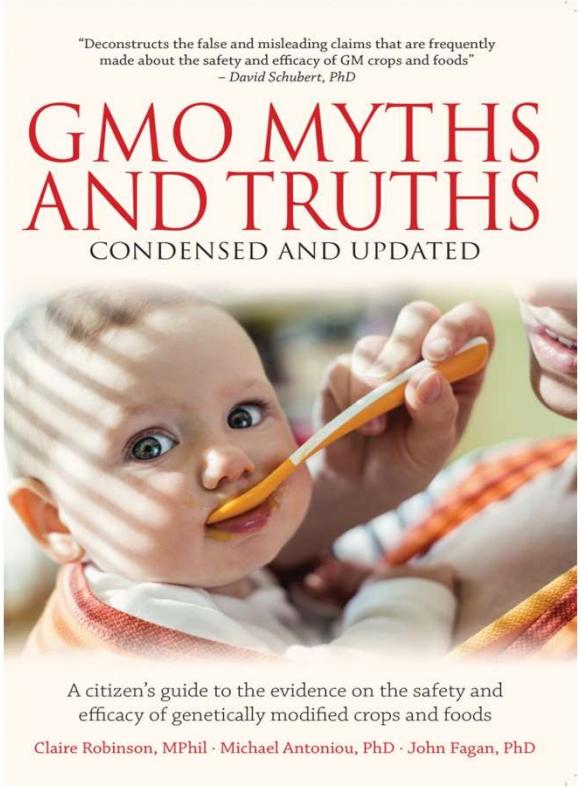
  Acreage is most important component – expand mustard cultivation to non-traditional areas including in South India; grow mustard in rice fallows.
- Higher acreage can be achieved
  - Incentives: MSP, market price, other
  - Higher import duty
  - Comparative benefit with other rabi crops like wheat

Mandi Price (Bharatpur) compared with Production (India)

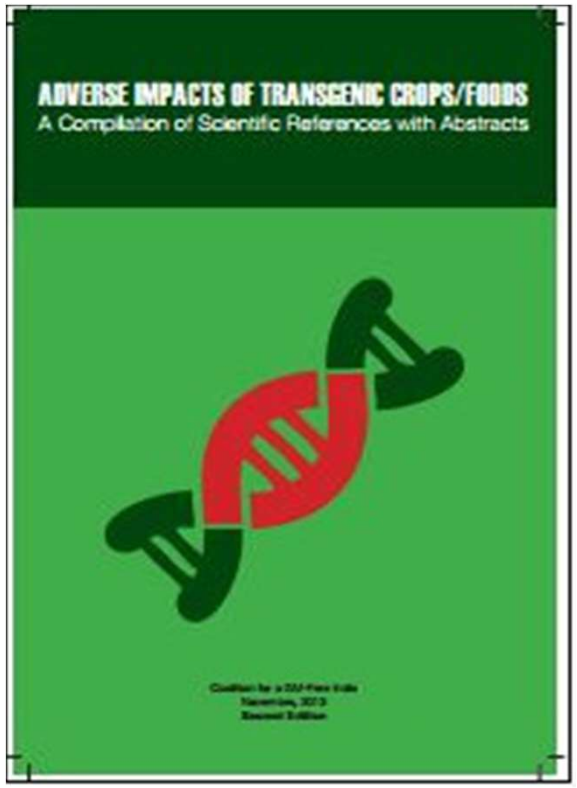


Source : Production : http://www.drmr.res.in/rmv/selectRMvariety.php
Mandi Price : https://agmarknet.gov.in/

SCIENTIFIC OPPOSITION TO GM CROPS



4th edition of
'GMO MYTHS AND TRUTHS'
can be accessed at :
https://www.amazon.com/GMO-Myths-Truths-Citizens-Genetically/dp/0993436722



Over 400 peer reviewed scientific studies on 'ADVERSE IMPACTS OF TRANSGENIC CROPS/FOODS' can be accessed at :
www.indiagminfo.org/wp-content/uploads/2013/11/Sci-ref-complete-book-2nd-edition.pdf

Some Questions to this house

- What is the logic behind producing seeds of a hybrid, whose yield superiority is yet to be established and it is a potential low yielder with smaller seed size?
- How scientific is the approach to conduct "demonstration" cum "seed production" cum "testing of impact on honey bees" cum "yield trials under AICRP" together that too through "Environmental Release"?
- What is the logic behind "Environmental Release" of parental lines?
- How the valuable germplasm will be saved from contamination through Bar-Barnase- Barstar genes imparting MS and HT traits in a crop, whose centre of origin is India?
- Why Socio-economic Impact Analysis does not include impact on trade of honey and potential loss of employment?
- Where is the proof that transgenic male sterility is better than cytoplasmic male sterility in this case? Even if proven better; is it really worth against the risks?
- What is the compelling need to introduce GM mustard, a food crop, having centre of diversity in India, having HT trait, which is not tested as per the stipulated protocol, a potentially low yielder that too with small seed size, against the will of people while safer alternatives exist?

What each of us can do in such a situation?

Thank you