



Comments on UDSC proposal for commercial release of transgenic hybrid DMH-11

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ICAR-Adopted Protocol & Criteria for mustard variety / hybrid release

Sr No	Specifications	Recommended protocol of ICAR	Case of DMH-11	Remarks
1	Minimum number of Years	At least 3 in each year for three years in each zone	Not followed	If trials are less than the recommended protocol the trial is repeated
2	Minimum number of Locations	Minimum 3 each year in each Zone	Not followed	Only 8 trials in the case of DMH-11. * In Zone II, applicant has taken 2 trials in 2 locations in BRL I (1st year), 1 trial in 1 location in BRL I (2 nd year) and 3 trials in 3 locations in BRL II. * In Zone III, 1 trial in 1 location in BRL I (1 st year) and same in 2 nd year.
3	Check / Comparators Selection	For hybrid trials, <u>hybrid checks are essential</u>	Not followed	(Recommended Zonal and National Checks of Varieties are also used in ICAR protocols)
4	Release/ Notification			Minimum 10% higher seed/oil yield over existing best Check

Does GEAC evaluation pass scientific muster?

Criteria for Promotion of New Cultivar

Proper Evaluation is necessary, which includes:

- Zone wise Evaluation
- Trials should be conducted in at **least 3 locations** in each zone.
- At least 10% gain over existing best checks either in terms of seed / oil yield.
- Trials should be conducted for at least 3 years
- Trials are conducted by coding the names of cultivars, so human bias is avoided.
- Proper Scrutiny is scientific fora- AICRP

Violation of RCGM and GEAC Decisions by applicant of DMH-11 (2010-11)

Decisions in GEAC meetings	Permission Letter	Actual trial	Remarks
<p>BRL I 1st Year Trials permission, 103rd meeting of GEAC, 29/9/10: “6.3.2 Transgenic parents Varunabarnase (even bn3.6) and EH2 barstar (event modbs2.99), one non-transgenic parent (EH2), one national check (varuna) and one zonal check would be planted along with transgenic mustard hybrid DMH-11”</p>	<p>No. BT/BS/17/30/97-PID, dated 15/10/2010, by Member Secretary RCGM in DBT: “a) 1) To generate biosafety data with focus on environmental safety assessment parameters...on productivity of transgenic mustard hybrid DMH-11 corresponding to non-transgenic counterparts and checks.</p>	<p>Recommended checks during BRL I trial: National – 1.Kranti (variety) 2. DMH-1 (hybrid) Zonal – Zone II- NRCDR -2 Zone III- RGN-73 Actually used National checks :- Varuna zonal checks Zone II RL-1359 Zone III Maya</p>	<p>Applicant has used convenient checks instead of recommended which amounts to rigging of trials to get favorable data.</p>

Violation of RCGM and GEAC Decisions by applicant of DMH-11 (2011-12)

Decisions in GEAC meetings	Permission Letter	Actual trial	Remarks
<p>BRL I 2nd Year Trials Decision, 112th GEAC meeting on 21/9/2011: “5.14.4 It was also noted that the trials will be done in Randomized Complete Block Design with six replications with transgenic and non-transgenic hybrids”</p>	<p>Letter No. BT/BS/17/30/97-PID, dated 17/10/2011, from Member Secretary, RCGM: i) Appropriate National and local checks and spacing are to be included for comparison of the efficacy of the gene in terms of productivity.....</p>	<p>Recommended checks during BRL I trial: National – 1.Kranti (variety) 2. DMH-1, NRCHB-506 (hybrids) Zonal – Zone II- NRCDR -2 Zone III- RGN-73 Actually used National check:Varuna Zonal checks: Zone II RL-1359 Zone III Maya</p>	<p>Applicant has used convenient checks instead of recommended which amounts to rigging of trials to get favorable data</p>

Violation of RCGM and GEAC Decisions by applicant of DMH-11 (2014-15)

Decisions in GEAC meetings	Permission Letter	Actual trial	Remarks
<p>BRL II Trials Decision, 121st GEAC meeting on 18/7/2014: “4.4.4 The Committee took note of the field experiment design and proposed isolation measures as given below: Randomised Block Design with five replications with transgenic and non-transgenic mustard hybrids”.</p>	<p>File No. 12013/35/2010-CS-III, dated 28/10/2014 and 7/11/2014, from Member Secretary GEAC: “7.0 Trial Protocol: Appropriate national and local checks and spacing are to be included for comparison of the efficacy of the transgenic mustard hybrid and parental lines in terms of productivity....”</p>	<p>Recommended checks during BRL II trial: National – 1.Kranti (variety) 2. DMH-1, NRCHB-506 (hybrids) Zonal – Zone II- RH0749 Zone III- RGN-73 Actually used National check:Varuna Zonal checks: Zone II RL-1359 Zone III Maya</p>	<p>The mentioned checks were recommended by ICAR for the trials but applicant has used convenient checks instead of recommended which amounts to rigging of trials to get favorable data. Moreover variety Varuna was recommended as national check only up to 2006-07 season and subsequently the recommendations for Varuna was withdrawn.</p>

Claim Made by the Developer

Variety	Mean Seed Yield kg/ha			Overall mean	% Increase over check
	2010-11	2011-12	2014-15		
Varuna	2093	2617	1887	2199	28.41
Varuna Barnase	2096	2640	1861	2199	
EH-2	1897	2007	1378	1761	
EH-2 Barstar	2009	1856	1558	1808	
Zonal Check	2037	2323	1776	2045	38.05
DMH-11	2600	3485	2386	2824	

-:Claim:-

28.4 % more yield than Varuna (NC) and
38.1% more than zonal Check.

Check Your Checks (Zone II)

Years and Stage of Trials	Recommended by AICRP-RM			Used for testing DMH-11		
	Zonal Check	National Check	Latest Release/ Hybrid Check	Zonal Check	National Check	Latest Release/ Hybrid Check
2010-11 BRL I, 1st year	NRCDR-2	Kranti	DMH-1 NRCHB-506	RL-1359	Varuna	-
2011-12 BRL I, 2nd year	NRCDR-2	Kranti	DMH-1 NRCHB-506	RL-1359	Varuna	-
2014-15 BRL II	RH-0749	Kranti	DMH-1 NRCHB-506	RL-1359	Varuna	-

Comments:

- 1. Not a single BRL trial** is conducted as per recommended check.
- 2. Not a single hybrid ever used as a check.** Being a hybrid, DMH-11 MUST be compared with hybrid.
- This is **against the protocol and conditions** in the permission letter.

Check Your Checks (Zone III)

Years and Stage of Trials	Recommended by AICRP-RM			Used for testing DMH-11		
	Zonal Check	National Check	Hybrid Check	Zonal Check	National Check	Hybrid Check
2010-11: BRL I- 1st year	RGN-73	Kranti	DMH-1	Maya	Varuna	-
2011-12: BRL I- 2nd year	RGN-73	Kranti	DMH-1	Maya	Varuna	-
2014-15: BRL II	RGN-73	Kranti	DMH-1	Maya	Varuna	-

Comments:

- Not a single BRL trial** is conducted as per recommended check.
- Not a single hybrid ever used as a check.** Being a hybrid, DMH-11 MUST be compared with hybrid.
- This is **COMPLETE VIOLATION of the protocol and conditions** in the permission letter.

Seed Yield (kg/ha) of transgenic mustard hybrid trials conducted during 2006-07 under the supervision of NRCRM, Bharatpur, ICAR

Entry	Delhi	Bharatpur	Kanpur	Pantnagar	Navgaon	Sriganganagar	Kota	Gwalior	Hisar	SK Nagar
Varuna	1395	565	1168	952	1111	1527	2466	592	771	1690
Kranti	1503	940	1380	1232	1097	1606	2433	880	889	2272
Zonal Check	1313	1003	1577	1208	1002	1344	2368	755	740	2295
DMH-1	1884	1098	1110	1666	1434	1501	2488	1289	1302	1975
DMH-11	1748	923	1319	1311	1264	1370	2325	1347	1553	2349

Reference : Reports from AICRP-RM, DRMR

Seed Yield (Kg/ha) performance of transgenic hybrid DMH-11 in AICRP MLRT (2006-07)

Strain	Seed Yield (Kg/ha)		DMH-11 % percentage increase
	Range	Mean	
Varuna	565-2466	1224	26.7%
Kranti	880-2433	1423	9%
Zonal Check	755-2368	1361	14%
DMH-1	1098-2488	1575	-1.5%
DMH-11	923-2349	1551	-

Reference : Reports from AICRP-RM, DRMR

DMH-11 Seed Yield (Kg/Ha) under Biosafety Research Level I Trial, 1st Year (Rabi 2010-11)

S. No	Entry	ICAR Centre			Mean
		Kumher	Alwar	Sriganganagar	
1	Varuna (barnase)	1986	1789	2513	2096
2	EH-2 (barstar)	1730	1842	2455	2009
3	Varuna	1866	1741	2670	2093
4	EH-2	1793	1716	2182	1897
5	DMH-11	2285	2515	3000	2600
6	Maya/RL- 1359(ZC)	2057	1767	2287	2037

DMH-11 Seed Yield (Kg/ha) under Biosafety Research Level-I Trial, 2nd Year (Rabi 2011-12)

S. No	Entry	ICAR Center		Mean
		Kumher	Alwar	
1	Varuna (barnase)	2484	2098	2291
2	EH-2 (barstar)	1640	1581	1611
3	Varuna	2375	2169	2272
4	EH-2	1873	1608	1741
5	DMH-11	2892	3157	3025
6	Maya/RL-1359(ZC)	2195	1836	2016

DMH-11 Seed Yield (Kg/ha) under BRL-II trials (Rabi 2014-15)

S. No	Entry	ICAR Center			Mean
		Delhi	Bhatinda	Ludhiana	
1	Varuna (barnase)	1700	1947	1937	1861
2	EH-2 (barstar)	1110	1562	2001	1558
3	Varuna	1746	1910	2006	1887
4	EH-2	953	1442	1739	1378
5	DMH-11	1879	2734	2543	2385
6	Maya/RL-1359(ZC)	1571	1791	1965	1776

DMH-11 compared with existing varieties (Zone II)

Cultivar	Year of Trials	Number of trial years	Number of Trials	MSY (Kg/ha)	% Difference in MSY of DMH-11 over respective cultivar
Varieties (MSY based on AICRP trials)					
RH-749	2009-10, 2013-14, 2014-15	3	20	2553	3.3
DRMRIJ-31	2010-11 to 2012-13, 2014-15	4	28	2481	6.3
NRCDR-2	2003-04 to 2005-06, 2009-10 to 2013-14	8	111	2297	14.8
Transgenic Hybrid (MSY based on BRL trials)					
DMH-11 (Only BRL Trials)	2010-11, 2011-12, 2014-15	3	6	2638	

Comments:

1. Yield advantage of DMH 11 over two existing varieties is less than 10 % in Zone II

DMH-11 compared with existing Hybrids (Zone II)

Cultivar	Year of Trials	Number of trial years	Number of Trials	MSY (Kg/ha)	% Difference in MSY of DMH-11 over respective cultivar
Hybrids (MSY based on AICRP trials)					
DMH-1	2004-05, 2009-10 to 2014-15	7	42	2559	3.1
NRCHB-506	2005-06, 2009-10 to 2014-15	7	35	2300	14.7
CORAL -437	2006-07 to 2008-09, 2010-11	4	20	2542	3.8
Transgenic Hybrid (MSY based on BRL trials)					
DMH-11 (Only BRL Trials)	2010-11, 2011-12, 2014-15	3	6	2638	

Comments:

1. Yield advantage of DMH 11 over two existing hybrids is less than 10 % in Zone II

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

Varieties/hybrids	1000 seed weight (g)	Oil content (%)
RH 749	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

CONCLUSIONS

- Recently released **Varieties** RH-0749 (2013) & DRMRIJ 31 (2014) gave similar yield to transgenic hybrid DMH-11 in Zone II.
- MLT's data indicates that **non-transgenic hybrids** DMH-1 and CORAL-437 also gave similar yield over transgenic hybrid DMH-11 in Zone II.
- DMH-11 has no yield advantage over varieties and hybrids released in recent years.
- In such a case, how will DMH-11 release reduce the oil import bill of India?

Why should DMH-11 be released?