

# Proposal for Notification and Release of Pearl Millet Hybrid MPMH 17 (MH 1663) (Mandor Pearl Millet Hybrid 17)



Submitted to  
Central Sub-Committee on Crop Standards, Notification & Release of Varieties  
by  
All India Coordinated Pearl Millet Improvement Project  
(Indian Council of Agricultural Research)  
Mandor, Jodhpur – 342 304, Rajasthan, India

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### **Summary of Proposal (in bullets only)**

- MPMH 17 is a dual-purpose hybrid of pearl millet providing high grain and stover yields.
- The hybrid MPMH 17 is a cross between male-sterile line ICMA04999 (female parent) and restorer MIR 525-2 (male parent). The line ICMA04999 is based on A<sub>1</sub> source of cytoplasmic male-sterility.
- Tested in the All India Coordinated Pearl Millet Improvement Project trials during 2009-2011 at 57 locations (18 locations each in 2009 and 2011; and 21 locations in 2010) along with four checks viz., Pusa 23, ICMH 356, GHB 744 and RHB 121.
- Consistent performance of MPMH 17 very during three years of evaluations: hybrid ranked first among all test entries including checks in 2009 and 2011 and ranked 2<sup>nd</sup> in 2010.
- On an average, it provided grain yield of 2835 kg/ha which was 10-40% higher than yields of four checks i.e. Pusa 23 (2028 kg/ha), ICMH 356 (2371 kg/ha), GHB 744 (2543 kg/ha) and RHB 121 (2576 kg/ha).
- MPMH 17 also provided higher stover yield (64q/ha) than Pusa 23 (52 q/ha), ICMH 356 (56 q/ha) and GHB 744 (63 q/ha), though its stover yield was slightly (1.5%) lesser than that of RHB 121 (65 q/ha).
- The maturity duration of MPMH 17 and four checks was almost at par (77-79 days). In spite of same crop duration, the considerable superiority of MPMH 17 to checks highlights that the growth rate and per day productivity of this hybrid is higher than those of checks.
- Another distinctive advantage of MPMH 17 is its high level of resistance to downy mildew and blast, two most important diseases of pearl millet. Under artificially created epiphytotic conditions at 19 hot-spot locations during 2009-2011, MPMH 17 showed only 1.2% downy mildew incidence in comparison to 2-6% downy mildew incidence on checks.
- Blast incidence in this hybrid was 9% in comparison to 10-15% of that of four checks.
- MPMH 17 responded very favourably to the additional doses of nitrogen. The yield improvement at 60 kg N/ha and 90 kg N/ha 802 was 12% and 20%, respectively over the basal dose of 30 kg N/ha during testing in AICPMIP trials.
- The hybrid MPMH 17 matures, on an average, in 79 days and takes 48 days to flower. It is high tillering (2.7 panicles/plant) and produces very compact panicles of 22-24 cm length filled with medium sized grains (seed weight of 8.0 g/1000 grain) of globular shape and grey-brown colour. The hybrid attains the height of approximately 180 cm and produces panicles that are, on an average, 2.6 cm thick.
- Looking to its grain and stover yields and disease resistance, MPMH 17 is being proposed for identification for rainfed conditions of Kharif season in the states of Rajasthan, Gujarat, Haryana, Punjab, Madhya Pradesh, Uttar Pradesh and Delhi under rainfed conditions of kharif season.

**Proforma for Submission of Proposal for Release of Crop Variety to Central Sub-Committee on Crop Standards Notification and Release of Varieties**

1	Name of the crop and species	:	Pearl millet ( <i>Pennisetum glaucum</i> (L.) R. Br.]
2	a) Name of the variety under which tested in AICRP trials	:	MH 1663
	b) Proposed name of the variety	:	MPMH 17
3	Sponsored by (institute)	:	
4	a) Institution or agency responsible for developing variety (with full address)	:	Project Coordinator All India Coordinated Pearl Millet Improvement Project, Mandor, Jodhpur (Raj.)
	b) Name of the person who helped in the development of the variety Developers Collaborators	:	<ul style="list-style-type: none"> <li>• Xxxxx</li> <li>• Xxxxx</li> <li>• Xxxxx</li> <li>• Xxxxx</li> <li>• Xxxxx</li> </ul>
5	a) Parentage (with details of its pedigree including source from which variety/Inbred/ A, B and R lines of hybrid has been developed)	:	ICMA 04999 x MIR 525-2 Female parent <b>ICMA 04999</b> developed at ICRISAT, Patancheru by backcrossing ICMB 04999 to 81A cytoplasm source. Male parent <b>MIR 525-2</b> developed at AICPMIP, Jodhpur
	b) Source of material in case of introduction	:	NA
	c) DNA profile of variety/hybrid/inbred/A, B, R line of hybrid vis-à-vis check variety/ line		Attached (see annexure ---)
	d) Breeding method used	:	Pedigree and back cross breeding for parental lines and heterosis Breeding for hybrid
	e) Breeding objective	:	High and stable yields, resistance to downy mildew and blast and other diseases
6	State the varieties which are most closely resemble the proposed variety in general characters	:	RHB 121 (Alternative to ICMH 356, Pusa 23, RHB 121 and GHB 744)
7	Recommended productions ecology (Rainfed/Irrigated; high/low fertility; season)	:	Rainfed, Kharif, both high and low fertility

8	Specific area of its adaptation (zones and states for which variety is proposed) and recommended productions ecology	:	Zone A of AICPMIP comprising of states of Rajasthan, Gujarat, Haryana, Punjab, Madhya Pradesh, Uttar Pradesh and Delhi		
9	Description of hybrid/variety	:			
	a) Plant height	:	179 cm (175 - 185 cm)		
	b) Distinguishing morphological characters	:	Hybrid MPMH 17 possesses yellow anthers, has pubescence at nodes, shows complete exertion and has long brown bristles that are very helpful in reducing the extent of bird damage in crop. Anthocyanin pigmentation of glumes and tip sterility are absent in hybrids as well as in both parental lines of hybrid. The flowering time of both parental lines is similar (47 days) and thus no problem in nicking is encountered in certified seed production plots of hybrid.		
	c) Maturity (range in number of days) (from seedling/ transplanting to flowering, seed to seed)	:	79 days (--- to – days)		
	d) Maturity group (early, medium and late wherever such classification exists)	:	Medium		
	e) Reaction to major diseases under field and controlled conditions (reaction to physiological strains/ races/pathotypes/ bio-types to be indicated wherever possible )	:	Highly resistant to downy mildew Highly resistant to blast		
	f) Reaction to major pests (under field and controlled condition including store pests)	:	Resistant to stem borer, shoot fly (see Annexure ----)		
	g) Agronomic features (e.g. resistance to lodging, shattering, fertilizer responsiveness, suitability to early or late sown conditions, seed rate etc.)	:	Highly responsive to fertilizers and suitable for both early and late plantings (see Annexure ----)		
	h) Quality of produce	:			
	Grain quality	:	Good and acceptable		
	Fodder quality	:	Good and acceptable		
	i) Reaction to stresses	:	Tolerant (see Annexure ----)		
10	Description of the parents of	:	A line/Inbred 1	B line/Inbred 2	R line

	the hybrid				
	a) Plant height (cm)	:	181 cm	180 cm	185 cm
	b) Distinguishing morphological characters	:	No bristles Brown anther	No bristles Brown anther	Brown bristles Yellow anther
	c) Days to flowering	:	47	47	47
	d) Days to maturity (range in number of days – from seed to seed )	:			
	e) Is there any problem of synchronization? If yes, method to overcome it	:	No	No	No
	f) Reaction to major diseases (under field and controlled conditions, reaction to physiological strains/ races/bio-types/ pathotypes to be indicated wherever possible)	:	Resistant	Resistant	Resistant
	g) Reaction to major pests (under field and controlled conditions including store pests)	:	Resistant	Resistant	Resistant
	h) Agronomic features (e.g. resistance to lodging, shattering, fertilizer responsiveness, suitability to early or late sown conditions, seed rate etc.)	:	Highly responsive to fertilizers and good management	Highly responsive to fertilizers and good management	Highly responsive to fertilizers and good management
	i) Reaction to stresses	:			
11	a) Yield data in coordinated trials (breeding, agronomy, pathology, entomology, quality etc) regional/inter regional district trials year wise (levels of fertilizer application, density of plant population and superiority over local control/standard variety to be indicated (to be attached)	:	See Table ---		
	b) Yield data from national, demonstration/large scale demonstrations (to be attached)	:	See Table ---		
12	a) Agency responsible for maintaining breeder seed	:	All India Coordinated Pearl Millet Improvement Project, Mandor, Jodhpur (Raj.)		

	b) Quantity of breeder seed in stock (kg) Variety A line B line R line Hybrid	:	 --- kg --- kg --- kg --- kg
13	Specific recommendations, if any, for seed production (e.g. staggered sowing, plating ratio of parental lines of hybrids in foundation and certified seed production, probable area of seed production)	:	Flowering time of both A and R lines are similar and hence no need of staggered planting. Ratio of 4Female and 1Male can be followed in seed production plots. Any area that highly productive and where isolations are available preferably in the rain-free season.
14	Vivid presentation (field view, close-up of single plant and seed/economic parts)		Pictures attached
15	a) Whether recommended by any workshop, seminar, conference, state seed committee etc.	:	Recommended by the 55 <sup>th</sup> All Indian Coordinated Pearl Millet Improvement Workshop held at --- during ----- 2014
	b) If so, its recommendations with specific justifications for the release of proposed variety	:	Recommendation are ----- ----- ----- -----
16	c) Specific area of its adaptation	:	Rainfed, Kharif, both high and low fertility in Zone A of AICPMIP comprising of states of Rajasthan, Gujarat, Haryana, Punjab, Madhya Pradesh, Uttar Pradesh and Delhi
17	Acknowledgement of submission of seed sample of variety/hybrid/inbred/ A, B and R lines of hybrid from NBPGR and IC numbers		Attached
18	Package of practices along with attainable yield levels		Attached (See Annexure ----) a) Sustainability of variety for the area; b) Selection of field/land preparation; c) Seed treatment; d) Sowing time; e) Seed rate/sowing method-line sowing with Row to row & Plant to Plant distance; f) Fertilizer doses; g) Weed control; h) Disease & Pest Control; i) Irrigation;

			j) Harvesting; k) Quality characteristics of the variety, if any
19	Information on acceptability of the variety by farmers/ consumers/ industry	:	Acceptable (see annexure ----)
20	Any other pertinent information	:	----- (Seed annexure -----)

Signature of proposer and contributors

Signature of Head of institution



Checklist for proforma for submission of proposal for release of crop - variety to central sub-committee on crop standards notification and release of varieties

Details/document	Attached	
Parentage with details of its pedigree including source from which variety/Inbred/A, B and R lines of hybrid has been developed	Yes✓	No
Source of material in case of introduction (IC/EC numbers provided by NBPGR)	Yes✓	No
Flow chart of details of development of variety/ parental lines of hybrids	Yes✓	No
Molecular/ DNA profile of variety/hybrid/A, B, R line of hybrid vis-à-vis check variety/ line (details of unique amplicons that distinguishing markers along with photographs	Yes✓	No
Detailed description of hybrid/variety	Yes✓	No
Detailed description of the parental lines of hybrid	Yes✓	No
Yield data and other data on diseases, insect-pest, quality etc. from coordinated trials	Yes✓	No
Yield data from national, demonstration/large scale demonstrations	Yes✓	No
Specific recommendations, if any, for seed production (e.g. staggered sowing, plating ratio of parental lines of hybrids in foundation and certified seed production, probable area of seed production etc.)	Yes✓	No
Vivid presentation (field view, close-up of single plant and seed) with the help of photographs of the variety)	Yes✓	No
Recommendation of workshop, conference	Yes✓	No
Acknowledgement of submission of seed sample of variety/hybrid/ A, B and R lines of hybrid submitted to NBPGR	Yes✓	No
Package of practices	Yes✓	No
Proforma signed by all co-authors and Head of Organization	Yes✓	No
Any other pertinent information	Yes✓	No

Signature of Head of Institution

**Table 1. Summary of grain yield (kg/ha) data of Coordinated Hybrid Trials**

**Name of proposed Hybrid:** MH 1663 (MPMH 17) **Adaptability zone** : Zone A (Raj., Guj., Haryana, Punjab, MP, UP, Delhi)  
**Production condition** : Kharif (Rainfed)

Parameter	Year of testing	No. of trials	Proposed Hybrid MH 1663	Check Hybrids				Qualifying Hybrid MH 1655
				Pusa 23	ICMH 356	GHB 744	RHB 121	
Mean grain yield (kg/ha)	2009	18	2818	2232	2409	2677	2680	2756
	2010	21	2584	1930	2272	2436	2443	2521
	2011	18	3144	1938	2448	2533	2627	2967
	<b>Mean</b>	<b>57</b>	<b>2835</b>	<b>2028</b>	<b>2371</b>	<b>2543</b>	<b>2576</b>	<b>2736</b>
Per cent increase (+) or decrease (-) over checks	2009			(+) 26.2	(+) 17.0	(+) 5.3	(+) 5.1	(+) 2.2
	2010			(+) 33.9	(+) 13.7	(+) 6.1	(+) 5.8	(+) 2.5
	2011			(+) 62.2	(+) 28.4	(+) 24.1	(+) 19.7	(+) 6.0
	<b>Mean</b>			(+) <b>39.8</b>	(+) <b>19.6</b>	(+) <b>11.5</b>	(+) <b>10.1</b>	(+) <b>3.6</b>
Frequency in the top 5 group	2009		8/18	0/18	1/18	4/18	5/18	5/18
	2010		14/21	1/21	5/21	11/21	11/21	11/21
	2011		16/18	1/18	3/18	5/18	6/18	12/18
<b>Pooled for 3 years</b>	<b>Mean</b>		<b>38/57</b>	<b>2/57</b>	<b>9/57</b>	<b>20/57</b>	<b>22/57</b>	<b>28/57</b>

**Note:** 1. The proposed hybrid MH 1663 and qualifying hybrid have completed three years of testing in coordinated trials  
2. Year wise and centre wise data appended at Annexure I.

Ref. – AIPMIP Annual Report 2009-10 (Page BR 37), 2010-11 (Page BR 99), and 2011-12 (Page Breeding 84)

**Note:**

1. Qualifying variety is one which has completed three years of testing in coordinated trials
2. Centre- wise and year -wise data must be appended, otherwise proposal will not be considered

**Table 2. Summary of dry fodder yield (q/ha) data of Coordinated Hybrid Trials**

**Name of proposed Hybrid:** MH 1663 (MPMH 17)      **Adaptability zone** : Zone A (Raj., Guj., Haryana, Punjab, MP. UP, Delhi)  
**Production condition** : Kharif (Rainfed)

Parameter	Year of testing	No. of trials	Proposed Hybrid MH 1663	Check Hybrids				Qualifying Hybrid MH 1655
				Pusa 23	ICMH 356	GHB 744	RHB 121	
Mean dry fodder yield (kg/ha)	2009	15	69	64	61	72	71	69
	2010	18	61	45	55	60	63	65
	2011	16	62	48	52	58	63	62
	<b>Mean</b>	<b>49</b>	<b>64</b>	<b>52</b>	<b>56</b>	<b>63</b>	<b>65</b>	<b>65</b>
Per cent increase (+) or decrease (-) over checks	2009			(+) 7.8	(+) 13.1	(-) 4.2	(-) 2.8	0.0
	2010			(+) 35.6	(+) 10.9	(+) 1.7	(-) 3.2	(-) 6.2
	2011			(+) 29.2	(+) 19.2	(+) 6.9	(-) 1.6	0.0
	<b>Mean</b>			(+) <b>23.1</b>	(+) <b>14.3</b>	(+) <b>1.6</b>	(-) <b>1.5</b>	(-) <b>1.5</b>

**Note:** 1. The proposed hybrid MH 1663 and qualifying hybrid have completed three years of testing in coordinated trials

2. Year wise and centre wise data appended at Annexure II.

Ref. – AIPMIP Annual Report 2009-10 (Page BR 39), 2010-11 (Page BR 100), and 2011-12 (Page Breeding 85)

**Table 3. Summary of days to 50% flowering data of Coordinated Hybrid Trials**

**Name of proposed Hybrid:** MH 1663 (MPMH 17) **Adaptability zone** : **Zone A** (Raj., Guj., Haryana, Punjab, MP. UP, Delhi)  
**Production condition** : **Kharif (Rainfed)**

Parameter	Year of testing	No. of trials	Proposed Hybrid MH 1663	Check Hybrids				Qualifying hybrid MH 1655
				Pusa 23	ICMH 356	GHB 744	RHB 121	
Mean Days to 50% flowering	2009	19	49	48	48	51	49	48
	2010	21	48	47	47	49	47	48
	2011	18	47	45	46	47	46	49
	Mean	58	48	47	47	49	47	48

**Note:** Year wise and centre wise data appended at Annexure III.

**Table 4. Summary of days to maturity data of Coordinated Hybrid Trials**

**Name of proposed Hybrid:** MH 1663 (MPMH 17) **Adaptability zone** : Zone A (Raj., Guj., Haryana, Punjab, MP. UP, Delhi)  
**Production condition** : Kharif (Rainfed)

Parameter	Year of testing	No. of trials	Proposed Hybrid MH 1663	Check Hybrids				Qualifying hybrid MH 1655
				Pusa 23	ICMH 356	GHB 744	RHB 121	
Mean Days to maturity	2009	16	79	77	79	80	78	78
	2010	16	79	79	79	80	77	80
	2011	14	78	76	78	78	77	78
	Mean	46	79	77	79	79	77	79

**Note:** Year wise and centre wise data appended at Annexure IV.

**Table 5. Summary of ancillary data of Coordinated Hybrid Trials**

Name of proposed hybrid: **MH 1663 (MPMH 17)**      Adaptability zone : **Zone A** (Raj., Guj., Haryana, Punjab, MP. UP, Delhi)

Production condition : **Kharif (Rainfed)**

Parameter	Year of testing	No. of trials	Proposed Hybrid MH 1663	Check Hybrids				Qualifying Hybrid MH 1655
				Pusa 23	ICMH 356	GHB 744	RHB 121	
Mean Plant height (cm)	2009	19	175	184	174	188	181	175
	2010	21	178	191	183	194	187	187
	2011	18	185	195	188	185	189	190
	<b>Mean</b>	<b>58</b>	<b>179</b>	<b>190</b>	<b>182</b>	<b>189</b>	<b>186</b>	<b>184</b>
Mean Productive Tillers/ plant	2009	19	2.7	2.3	2.5	2.4	2.6	2.7
	2010	20	2.8	2.4	2.7	2.7	2.9	2.8
	2011	17	2.6	2.3	2.6	2.6	2.9	3.0
	<b>Mean</b>	<b>56</b>	<b>2.7</b>	<b>2.3</b>	<b>2.6</b>	<b>2.6</b>	<b>2.8</b>	<b>2.8</b>
Mean Panicle length (cm)	2009	19	22	24	20	22	22	24
	2010	20	23	24	20	22	22	23
	2011	17	23	24	20	21	21	23
	<b>Mean</b>	<b>56</b>	<b>23</b>	<b>24</b>	<b>20</b>	<b>22</b>	<b>22</b>	<b>23</b>
Mean Panicle girth (cm)	2009	8	2.5	2.5	2.5	2.4	2.5	2.6
	2010	11	2.7	2.6	2.6	2.7	2.5	2.6
	2011	10	2.7	2.3	2.8	2.5	2.3	2.7
	<b>Mean</b>	<b>29</b>	<b>2.6</b>	<b>2.5</b>	<b>2.6</b>	<b>2.5</b>	<b>2.4</b>	<b>2.6</b>
Mean 1000 seed Wt. (g)	2010	15	8.0	8.6	9.6	9.4	7.8	7.4
	2011	12	8.1	7.9	8.9	7.9	7.6	8.2
	<b>Mean</b>	<b>27</b>	<b>8.0</b>	<b>8.3</b>	<b>9.3</b>	<b>8.7</b>	<b>7.7</b>	<b>7.8</b>
Protein (%)	2010	2	8.7	12.8	9.2	8.3	10.1	9.1
	2011	2	10.2	10.0	11.8	10.4	10.3	10.1
	<b>Mean</b>	<b>4</b>	<b>9.5</b>	<b>11.4</b>	<b>10.5</b>	<b>9.4</b>	<b>10.2</b>	<b>9.6</b>
Fat (%)	2010	2	5.8	4.7	6.0	5.4	5.3	4.6
	2011	2	6.8	5.8	6.3	5.9	6.1	6.2
	<b>Mean</b>	<b>4</b>	<b>6.3</b>	<b>5.2</b>	<b>6.2</b>	<b>5.7</b>	<b>5.7</b>	<b>5.4</b>

Ref: AIPMIP Annual Report 2009-10 (Page BR 45-54), Annual Report 2010-11 (Page BR 103-108 and BR 197-198) and Annual Report 2011-12 (Page Breeding 88-94 and Breeding 195-197)

**Table 6. Adaptability to change in agronomic conditions**

**Name of proposed Hybrid:** MH 1663 (MPMH 17)      **Adaptability zone** : **Zone A** (Raj., Guj., Haryana, Punjab, MP. UP, Delhi)  
**Production condition** : **Kharif (Rainfed)**

Experiment	Year of testing	No. of trials	Item	Proposed Hybrid MH 1663	Check Hybrid RHB 121	Qualifying Hybrid MH 1655
Fertilizer experiment response to nitrogen	2011	5	<b>Grain yield (kg/ha)</b>			
			N <sub>1</sub> (30 kg/ha)	2403	2364	2497
			N <sub>2</sub> (60 kg/ha)	2700	2637	2795
			N <sub>3</sub> (90 kg/ha)	2893	2863	3137
			<b>Mean</b>	<b>2665</b>	<b>2621</b>	<b>2810</b>
			<b>Dry fodder yield (kg/ha)</b>			
			N <sub>1</sub> (30 kg/ha)	74	72	75
			N <sub>2</sub> (60 kg/ha)	79	77	80
			N <sub>3</sub> (90 kg/ha)	85	83	89
			<b>Mean</b>	<b>79</b>	<b>77</b>	<b>81</b>
			<b>Days to 50% flowering</b>			
			N <sub>1</sub> (30 kg/ha)	46	45	49
			N <sub>2</sub> (60 kg/ha)	47	46	49
			N <sub>3</sub> (90 kg/ha)	47	46	48
			<b>Mean</b>	<b>47</b>	<b>46</b>	<b>49</b>
			<b>Plant height (cm)</b>			
			N <sub>1</sub> (30 kg/ha)	184	186	180
			N <sub>2</sub> (60 kg/ha)	184	186	183
			N <sub>3</sub> (90 kg/ha)	194	194	188
			<b>Mean</b>	<b>187</b>	<b>189</b>	<b>184</b>

Ref: AIPMIP Annual Report 2011-12 (Page Agro 22)

**Table 7. Reaction to major diseases**

**Name of proposed Hybrid:** MH 1663 (MPMH 17) **Adaptability zone** : Zone A (Raj., Guj., Haryana, Punjab, MP, UP, Delhi)

**Production condition** : Kharif (Rainfed)

Parameter	Year of testing	No. of Trials	Proposed Hybrid MH 1663	Check Hybrids				Qualifying hybrid MH 1655
				Pusa 23	ICMH 356	GHB 744	RHB 121	
Downy mildew % at 30 DAS	2009	7	0.8	0.18	1.07	0.58	0.8	0.0
	2010	7	0.3	0.7	0.9	0.5	2.8	0.2
	2011	5	0.0	1.4	0.5	2.7	6.1	1.0
	<b>Mean</b>	<b>19</b>	<b>0.4</b>	<b>0.7</b>	<b>0.8</b>	<b>1.1</b>	<b>2.9</b>	<b>0.3</b>
Downy mildew % at 60 DAS	2009	7	1.1	0.6	1.8	2.1	3.7	0.9
	2010	7	1.1	5.1	4.9	1.1	6.5	0.9
	2011	7	1.4	1.2	1.6	4.1	7.8	1.2
	<b>Mean</b>	<b>21</b>	<b>1.2</b>	<b>2.3</b>	<b>2.8</b>	<b>2.4</b>	<b>6.0</b>	<b>1.0</b>
Smut %	2009	4	13.0	20.3	25.4	7.6	11.7	9.6
	2010	4	9.4	19.6	26.6	14.1	19.3	10.7
	2011	4	8.7	24.5	20.9	20.2	16.4	11.1
	<b>Mean</b>	<b>12</b>	<b>10.3</b>	<b>21.4</b>	<b>24.3</b>	<b>14.0</b>	<b>15.8</b>	<b>10.5</b>
Rust %	2009	3	10.8	5.0	10.0	8.3	15.0	1.7
	2010	3	34.3	26.7	33.3	18.3	30.0	32.5
	2011	4	28.8	24.4	36.6	29.8	22.0	22.5
	<b>Mean</b>	<b>10</b>	<b>25.0</b>	<b>19.3</b>	<b>27.6</b>	<b>19.9</b>	<b>22.3</b>	<b>19.3</b>
Ergot %	2009	-	-	-	-	-	-	-
	2010	1	3.4	7.6	4.1	2.9	1.2	2.0
	2011	1	8.6	7.8	4.5	6.6	3.0	9.5
	<b>Mean</b>	<b>2</b>	<b>6.0</b>	<b>7.7</b>	<b>4.3</b>	<b>4.8</b>	<b>2.1</b>	<b>5.8</b>
Blast %	2009	1	7.5	17.5	9.0	17.5	17.5	5.0
	2010	3	6.7	12.0	5.2	4.2	7.7	7.7
	2011	3	12.6	19.8	16.7	13.5	20.6	11.0
	<b>Mean</b>	<b>7</b>	<b>9.3</b>	<b>16.1</b>	<b>10.6</b>	<b>10.1</b>	<b>14.6</b>	<b>8.7</b>

**Ref:** AIPMIP Annual Report 2009-10 (Page PP 52-67), 2010-11 (Page PP 72-81) and 2011-12 (Page Pathology 41-50)

**Note:** Year wise and centre wise data appended at Annexure IX.



**Table 8. Reaction to major insects**

**Name of proposed hybrid:** MH 1663 (MPMH 17)

**Adaptability zone** : Zone A (Raj., Guj., Haryana, Punjab, MP. UP, Delhi)

**Production condition** : Kharif (Rainfed)

Parameter	Year of testing	No. of trials	Proposed Hybrid MH 1663	Check Hybrids				Qualifying Hybrid
				Pusa 23	ICMH 356	GHB 744	RHB 121	MH 1655
Shoot fly damage (%) Seedling/vegetative stage (at 28-DAG)	2010	2	11.0	9.9	8.0	7.1	9.0	11.3
	2011	2	1.3	3.5	3.4	1.5	5.1	3.1
	<b>Mean</b>	<b>4</b>	<b>6.2</b>	<b>6.7</b>	<b>5.7</b>	<b>4.3</b>	<b>7.0</b>	<b>7.2</b>
Shoot fly damage (%) Earhead stage	2010	2	4.9	7.8	10.7	4.3	7.8	5.0
	2011	2	5.3	3.0	7.2	3.7	7.1	1.3
	<b>Mean</b>	<b>4</b>	<b>5.1</b>	<b>5.4</b>	<b>9.0</b>	<b>4.0</b>	<b>7.4</b>	<b>3.1</b>
Stem borer Damage Seedling stage (% infestation)	2010	2	7.4	5.5	5.1	6.5	4.4	7.3
	2011	1	6.1	5.2	6.1	11.3	13.5	14.8
	<b>Mean</b>	<b>3</b>	<b>7.0</b>	<b>5.4</b>	<b>5.4</b>	<b>8.1</b>	<b>7.4</b>	<b>9.8</b>
Stem borer Damage Earhead stage (% earhead loss)	2010	2	5.2	4.7	8.0	7.3	9.0	9.0
	2011	2	10.7	4.0	9.3	6.2	4.6	8.8
	<b>Mean</b>	<b>4</b>	<b>8.0</b>	<b>4.4</b>	<b>8.6</b>	<b>6.8</b>	<b>6.8</b>	<b>8.9</b>
Grey weevil Damage score Seedling stage (35 DAG)	2010	2	0.8	1.0	1.2	1.0	0.5	1.2
	2011	1	0.0	1.3	1.1	1.0	2.0	1.3
	<b>Mean</b>	<b>3</b>	<b>0.6</b>	<b>1.1</b>	<b>1.1</b>	<b>1.0</b>	<b>1.0</b>	<b>1.2</b>
Grey weevil Damage score Earhead stage (50 DAG)	2010	2	2.5	2.8	2.5	1.0	1.7	3.5
	2011	1	1.0	4.3	1.3	2.3	5.3	4.0
	<b>Mean</b>	<b>3</b>	<b>2.0</b>	<b>3.3</b>	<b>2.1</b>	<b>1.4</b>	<b>2.9</b>	<b>3.7</b>
Chafer Beetle Damage score	2010	2	0.8	0.0	0.3	1.2	0.2	1.2
	2011	2	0.0	0.5	0.0	0.2	0.8	0.0
	<b>Mean</b>	<b>4</b>	<b>0.4</b>	<b>0.3</b>	<b>0.2</b>	<b>0.7</b>	<b>0.5</b>	<b>0.6</b>

Ref: AIPMIP Annual Report 2010-11 (Page ENTO 13-16) and Annual Report 2011-12 (ENTO 9-12)

## Appendix I: DESCRIPTION OF THE PEARL MILLET HYBRID AND PARENTAL LINES

S. No.	Description	Hybrid	Female	Male
		MH 1663	ICMA 04999	MIR 525-2
1.	Plant : Growth habit	: Erect	Erect	Erect
2.	Time of spike emergence (days)	: Very Early (42)	Medium (47)	Medium (47)
3.	Leaf : Sheath pubescence	: Absent	Absent	Absent
4.	Leaf : Sheath length (cm)	: Long (17.4)	Long (15.9)	Medium (14.1)
5.	Leaf : Blade length (cm)	: Long (61.05)	Short (42.3)	Medium (51.4)
6.	Leaf : Blade width (at widest point) (cm)	: Broad (4.7)	Narrow (2.9)	Broad (4.2)
7.	Spike : Anther colour	: Yellow	Brown	Yellow
8.	Plant : Node pubescence	: Present	Absent	Present
9.	Plant : Number of nodes	: Low (8.4)	Low (9.9)	Low (7.5)
10.	Plant : Node pigmentation	: Purple	Brown	Brown
11.	Plant : Internode pigmentation	: Green	Green	Green
12.	Spike exertion	: Complete	Complete	Complete
13.	Spike : Length (cm)	: Medium (26.0)	Small (19.2)	Small (17.0)
14.	Spike : Anthocyanin pigmentation of glume	: Absent	Absent	Absent
15.	Spike : Bristle	: Present	Absent	Present
16.	Spike : Bristle colour	: Brown	-	Brown
17.	Spike : Girth [maximum point (excluding bristles) (cm)]	: Medium (3.0)	Medium (2.5)	Medium (2.2)
18.	Spike : Shape	: Lanceolate	Lanceolate	Conical
19.	Plant : Number of productive tillers	: Low (3.0)	Low (2.4)	Low (2.6)
20.	Plant : Height (excluding spike) (cm)	: Medium (181.2)	Short (105.5)	Short (141.5)
21.	Spike : Tip sterility	: Absent	Absent	Absent
22.	Spike : Density	: Very Compact	Compact	Compact
23.	Seed : Colour	: Grey brown	Deep grey	Yellow brown
24.	Seed shape	: Globular	Globular	Globular
25.	1000 Seed weight	: Small (6.5)	Small (7.2)	Small (6.6)

## PACKAGE OF PRACTICES

Name of the Crop: Pearl millet

Variety: -----

S.N.	Particulars	Details to be filled by SAU/ICAR Institute releasing the variety
1.	Suitability of the variety for the area (Recommended area for which variety has been released/recommended)	Rainfed conditions of kharif season for the state of Maharashtra
2.	Selection of field/land preparation (Type of topography, soil condition, tillage operation for seed bed etc.	Well drained and leveled field with plain topography, at least medium fertile soil
3	Seed Treatment(Recommended chemical with dosages)	No seed treatment required
4	Sowing time(Optimum sowing period)	Last week of June and first fortnight of July, depending upon the rains
5	Seed Rate/sowing method-line sowing with row to row and plant to plant distance	5 kg/ha, sowing to be done using seed drill or by animal-drawn plough
6	Fertilizer doses & Time of fertilizer's Application(Type and Quantity of fertilizers)	Fertilize with 30-40 kg P <sub>2</sub> O <sub>5</sub> /ha basal dose and 40-60 kg N/ha in two splits, half as basal and the second half 3 to 4 weeks later synchronizing with rains
7	Weed Control(Name of weedicide(s) with dosages and timing of mechanical weeding, if any)	Keep the field weed-free for the first 30 days either with weeding and hoeing or application of Atrazine @ 0.5 a.i./ha as pre-emergence spray followed by one weeding and hoeing at 4 to 6 weeks after sowing.
8	Major diseases and pest control (Type of pest and diseases with name of chemicals and dosages & timing of application	Use Apron 35 SD @ 2 g a.i./kg of seed followed by Ridomil 25 WP (1000 ppm) spray 20 days later to check downy mildew occurrence
9	Irrigation schedule(Critical stage for irrigation and method of irrigation)	Life saving irrigation should be provided at seedling stage and grain-filling stage
10	Harvesting(Approximate days of harvestable maturity)	Harvest the crop at maturity (76-80 days)
11	Quality characteristics of the variety, if any (Prominent characteristics of variety)	High in iron content and large seed size as compared to other currently available varieties of pearl millet
12	Expected yield of the variety per acre from .....qtls to .....qtls/acre (yield subject to use under area of adaption and the recommended climate conditions and adoption of package and practices)	1333-3477 kg/ha subject to use under area of adaption and the recommended climate conditions and adoption of package and practices)















## **Guidelines for Filling-up Proforma for Submission of Proposal for Release of Crop - Variety to Central Sub-Committee on Crop Standards Notification and Release of Varieties**

1. Name of the crop and species

The name given to the variety may be indicative of crop name, institute name/code, and number, if any.

2. Name of the variety under which tested

This should include the name under which the variety was tested in coordinated trials.

3. Proposed name of the variety

This should include the name of the variety that is being proposed for its commercial use as per existing guidelines.

4. Sponsored by (institute)

This should include the name of the institute/organization that is sponsoring the variety

5. Institution or agency responsible for developing variety (with full address)

Institute or organization where the variety was developed along with full address

6. Name of the person who helped in the development of the variety

Only those workers should be included who have contributed in the development of variety/hybrid. The co-workers can be grouped in 2 categories as 'Developer' and 'Collaborator'. The co-worker should be associated with the project (from which cultivar has been developed) for a period of minimum of 2 years. The proposal should be signed by each of co-worker and validated by Head of Organization.

7. Parentage (with details of its pedigree including source from which variety/Inbred/ A, B and R lines of hybrid has been developed)

This should essentially include the details of base population/ source of material used for developing the variety/parental lines of hybrid. Pedigree and parentage have to be furnished in detail as to how the parents have been developed with flow charts instead of just giving the code numbers. Flow chart should clearly depict the development of the proposed culture with year-wise details of attempting the initial cross followed by handling of segregating generation.

The details of indigenous collection (IC) or exotic collection (EC) number of accessions (provided by NBPGR), if used, in the development of variety or parental lines of hybrids must be provided. Please note that this IC number is different from the one that is provided by NBPGR upon submission of seed sample of line/hybrid/variety once variety/ hybrid is recommended by the Variety Identification Committee (VIC).

8. Source of material in case of introduction



Details of EC (Exotic collection) number provided by NBPGR for the imported material used in variety development.

9. DNA profile of variety/hybrid/inbred/A, B, R line of hybrid vis-à-vis check variety/line

Detailed information on the molecular discrimination should be provided. Such information can be developed at crop based institutes/NBPGR/Other labs. The information should include details of amplicons (name, sequence number, primer sequence) with reference to polymorphic markers. The relevant photographs should also be attached.

10. Breeding method used

The method used in developing the variety/parental line

11. Breeding objective

The breeding objective in the development of variety

12. State the varieties which are most closely resemble the proposed variety in general characters

The information should include the name of the varieties that resemble most closely with proposed variety with reference to different phenotypic traits.

13. Recommended productions ecology

The information on zones (name of the states), season and production conditions whether rainfed or irrigated should be mentioned.

14. Description of hybrid/variety

The average and expected normal range with respect to various characters may be mentioned.

15. Description of the parents of the hybrid

The average and expected normal range with respect to characters may be mentioned with reference to inbred/A line/ B line/ R line.

16. Yield data in coordinated trials (breeding, agronomy, pathology, entomology, quality etc) regional/inter regional district trials year wise (levels of fertilizer application, density of plant population and superiority over local control/standard variety to be indicated (to be attached)

The yield data and other data of coordinated trials and other details as per the format of tables should be appended. Please note that mean is 'weighted mean' and not 'arithmetic mean'.

17. Yield data from national, demonstration/large scale demonstrations (to be attached)

The yield and other details as per the format of tables should be appended.

18. Agency responsible for maintaining breeder seed

Name of the institute/organization/agency that is responsible to maintain the breeder seed of variety/parental line of hybrid.

19. Quantity of breeder seed in stock (kg)

Quantity (kg) of available seed with reference to variety, hybrid, inbred/A/B/R lines of hybrid to be clearly indicated.

20. Information on acceptability of the variety by farmers/ consumers/ industry

Any information on such aspects can be given

21. Specific recommendations, if any, for seed production (e.g. staggered sowing, plating ratio of parental lines of hybrids in foundation and certified seed production, probable area of seed production)

The seed production technology and specific requirements should clearly be mentioned along with proposal. With respect to seed production of hybrid, the staggered sowing of parental lines, if required, should be clearly indicated. The planting ratio of male and female parents in the seed production plots should also be indicated. In addition, if there are some other precautions to be taken they are to be clearly mentioned. The probable area of seed production needs to be given.

22. Vivid presentation (field view, close-up of single plant and seed/economic parts)

The proposal should invariably have coloured pictures with a clear field view of variety, a close-up of single plant and seed/economic part. Photograph of other plant parts which can be helpful in identification of varieties can also be given. The cover page of proposal should also have a coloured photograph of variety and should be well-designed.

23. Whether recommended by any workshop, seminar, conference, state seed committee etc.

Detail of workshop/ conference/ seminar/ or state variety release committee which recommended the variety for release.

24. If so, its recommendations with specific justifications for the release of proposed variety

The specific recommendation of the workshop/conference/state variety release committee along with the documents should be attached.

25. Specific area of its adaptation

The zones and states for which variety is proposed

26. Acknowledgement of submission of seed sample of variety/hybrid/inbred/ A, B and R lines of hybrid from NBPGR and IC numbers

The acknowledgement certificate issued by NBPGR providing details of IC number with respect to variety, hybrid and parental lines of hybrids should be part of the proposal

27. Package of practices along with attainable yield levels

A note on the package of practices of crop with respect to the variety needs to be provided particularly highlighting specific requirement of variety to realize its attainable yield levels.

28. Others

- One-page 'executive summary' of proposal may be provided in the beginning highlighting the specific features of the variety/hybrid. Excessive presentation in executive summary needs to be avoided.
- Page numbers should be provided at each page of proposal.
- Check-list needs to be part of the proposal.
- The CVRC proposal should be scrutinized at the level of Project Coordinator/Project Director before submission to CVRC. PCs/PDs will provide their comments on the proposal to member secretary (CVRC).

29. Any other pertinent information

Any other relevant information which is important with reference to variety, hybrid or parental lines of hybrids.