J. Agric. Res. Technol., 47 (1) : 083-087 (2022) https://doi.org/10.56228/JART.2022.47116

Phule Madhu - A Single Cross Sweet Corn Hybrid for Maharashtra

U. M. Borle[1], S. R. Kulkarni[2], S. S. Mahadik[3], P. K. Pawar[4] and A. T. Deokar[5]
All India Coordinated Maize Improvement Project, Kasaba Bawada, Kolhapur - 416 003 (India)
(Received : 03.07.2021 Accepted : 25.07.2021)

Abstract

Phule Madhu (QMHSC-1182), a single cross sweet corn hybrid from public sector in Maharashtra is developed from the cross between QMISC-1407 x QMISC-1408 through hybridization method. It is high yielding, yellow flint grain at green cob stage and orange yellow shrunken at maturity, moderately resistant to Turcicum leaf blight, Maydis leaf blight, Charcoal rot and Fusarium stalk rot and resistant to Stem borer (*Chilo partellus* Sw.) in field condition. It is sweet in taste having brix reading 14.89 percent. The green cobs in dough stage are ready to harvest within 80-85 days and total maturity of the crop takes about 95-100 days. In various states and varietal trials, the sweet corn hybrid QMHSC-1182 consistently recorded best performance. The sweet corn hybrid QMHSC-1182 recorded 12864 Kg ha^{-1} green cob yield with husk, which was 42.70 percent higher than checks Madhuri (9015 Kg ha^{-1}), 64.97 percent higher than Priya (7798 Kg ha^{-1}) and 45.01 percent higher than WOSC (8871 Kg ha^{-1}). It is superior for green fodder yield over the check Madhuri and Priya. The sweet corn hybrid is released under the name 'Phulen Madhu' for sweet corn growing area of Maharashtra in 2016.

Key words : Sweet corn hybrid, Phule Madhu (QMHSC-1182), resistance, high green cob yield.

Maize a high potential cereal is considered as a crop for next green revolution. Though it has been usually considered as "poor man's crop", it is reached in everywhere of society due to its multifarious uses as industrial, food, feed, fodder and seed crop . Now in Modern days, there is big demand for table purpose varieties like sweet corn, baby corn and pop corn.

Sweet corn differs from other corns because the kernels have high sugar content in the milk or early dough stage. The crop grows quickly and is considered a valuable rotational crop. The green cobs are harvested within 80-85 days which fetch the good market price as well as the farmers have additional benefit of green fodder for livestock.

Maize is the third most important cereal crop in India after rice and wheat. It occupies about 9.43 million hectares area having production of 24.35 million tones with an average productivity of more than 2.5 tonnes ha^{-1}, whereas in Maharashtra, the area, production and productivity was 9.47 lakh hectares, 31.24 lakh tones and 2.47 tonnes ha^{-1} respectively, during the year 2013-14. The maize seed industry in India is dominated by the private sector, both in normal maize as well as sweet corn. Very few areas are under the hybrids/varieties developed by public sector. Moreover, so far there is not a single sweet corn hybrid released in Maharashtra from public sector, an attempt was made almost exclusively for development of single cross sweet corn hybrid, with a view to make the seed available in cheaper rate to the farmers.

Material and Methods

Single cross sweet corn hybrid Phule Madhu

1. Ex-Asstt. Maize Breeder, 2. Ex-Maize Breeder, 3, 4. Sr. Res. Asstt. and 5. Ex-Sr. Res. Asstt.

Table 1. Summary table showing green cob yield with husk of sweet corn hybrid Phule Madhu (QMHSC-1182)

Name of the	Year	No. of locat-ions	Green cob yield with husk q ha^{-1}				% Increase over checks experiment		
			QMHSC-1182	Madhuri (C)	Priya (C)	WOSC	Madhuri (C)	Priya (C)	WOSC
Station trials	2012-14	03	130.30	88.12	69.99	-	47.53	86.17	-
Multilocation trials	2013-14	08	125.37	91.24	84.61	87.48	37.41	48.17	43.31
Inter-university trials	2013-14	06	112.72	75.09	79.35	70.29	50.11	42.05	60.36
Coordinated trials	2014	05	146.15	106.15	-	108.36	37.68	-	34.87
Grand Mean	22	128.64	90.15	77.98	88.71	42.70	64.97	45.01	
Adaptive trials (Mean of 17 farmers field)		95.26	86.35	-	-	10.33	-	-	

(QMHSC-112) has been evolved from a cross of QMISC-14.07 x QMISC-1408 at All India Coordinated Maize Improvement Project, Kolhapur during the year 2011. Among the several crosses made amongst different inbreds, a single cross QMHSC-1182 appeared to be most promising. It was therefore tested in station trial along with the check Madhuri, at Kolhapur during the year 2012-2014. Looking into the promising performance, this hybrid was promoted to multilocation trials and tested at 5 locations under *Kharif* during the year 2013.2014. It was tested in inter university trial at Kolhapur, Buldhana and Parbhani during 2013.2014. This hybrid was also tested in coordinated trials (Table 1) over 5 locations in zone IV (comprising of Cimbatore, Hyderabad, Karimnagar, Kolhapur and Mandya) during *Kharif*-2014. The performance of this hybrid was consistently superior over the national check Madhuri for yield as well as resistance to Turcicum leaf blight and stem borer. It was therefore released for commercial cultivation under *Kharif* season in Maharashtra in 2016 under the name 'Phule Madh'. The statistical analysis was carried out according to Panse and Sukhatme (1967).

Results and Discussion

Performance of QMHSC-1182 in different trials : In station trial during *Kharif*-2012-2014 sweet corn hybrid green cob yield with husk differences due to genotypes were

Table 2. Mean green cob yield with husk and stover yield of sweet corn hybrid QMHSC-1182 as influenced by different nitrogen levels and spacing during 2015-16, Kolhapur

Treatments	Green cob yield with husk (q ha^{-1})	Green fodder yield (q ha^{-1})
Genotype(3)		
QMHSC-1182	112.02	128.67
Madhuri	82.87	87.15
Priya	94.90	97.40
S.E.±	2.44	2.11
C.D. at 5%	9.58	8.30
C.V. %	10.72	8.59
Fertilizer levels(3)		
F_1 : 120 : 60: 40 kg NPK ha^{-1}	88.05	94.53
F_2 : 150 : 75: 50 kg NPK ha^{-1}	99.37	107.51
F_3 : 180 : 90: 60 kg NPK ha^{-1}	102.36	111.18
S.E.±	1.17	1.65
C.D. at 5%	3.52	4.95
C.V. %	5.16	6.71
Spacing (2)		
S_1 : 60 x 20	102.61	110.65
S_2 : 75 x 20	90.58	98.17
S.E.±	1.07	1.31
C.D. at 5%	3.13	3.82
C.V. %	5.77	6.51

Table 3. Performance of QMHSC-1182 for interaction effect with different spacing

Genotypes	Spacing			
	Green cob yield with husk (q ha^{-1})		Green fodder yield (q ha^{-1})	
	60 x 20	75 x 20	60 x 20	75 x 20
QMHSC-1182	115.12	108.91	131.34	126.00
Madhuri (C)	85.75	80.00	91.78	82.53
Priya (C)	106.97	82.82	108.82	85.97
S.E.±	1.86		2.26	
C.D. at 5%	5.42		6.61	

significant. Sweet corn hybrid QMHSC-1182 gave green cob yield with husk of 13030 Kg ha^{-1} (Table 1) which was 47.53 percent higher than the check Madhuri (8812 Kg ha^{-1}) and 86.17 percent higher than the another check Priya (6999 Kg ha^{-1}). In multilocation trials, QMHSC-1182 recorded 37.41 percent and 48.17 percent higher green cob yield with husk (12537 Kg ha^{-1}) than the checks Madhuri (9124 Kg ha^{-1}) and Priya (8461 Kg ha^{-1}), respectively. Whereas under inter university trial it gave 11272 Kg ha^{-1} green cob yield with husk which was 50.11 and 42.05 percent higher than the checks Madhuri (7509 Kg ha^{-1}) and Priya (7935 Kg ha^{-1}). Under coordinated trials QMHSC-1182 gave green cob yield with husk of 14615 Kg ha^{-1} which was 37.68 percent higher than the national check Madhuri (10615 Kg ha^{-1}). In 17 adaptive trials conducted on farmers field QMHSC-1182 (9526 Kg ha^{-1}) recorded 10.33 percent higher green cob yield than the check Madhuri (8635 Kg ha^{-1}).

In case of green fodder yield QMHSC-1182

Table 4. Performance of sweet corn hybrid QMHSC-1182 for ancillary characters

Entry	Days to 50% pollen	Days to 50% silk	Plant height (cm)	Ear height (cm)	Green fodder yield (q ha^{-1})	Grain colour
QMHSC-1182	60	61	140	40	115.83	Yellow
Madhuri (C)	58	59	135	40	60.00	Yellow
Priya (C)	52	53	110	48	58.17	Yellow
WinOrange (C)	56	57	128	50	66.50	Yellow

Table 5. Overall performance of QMHSC-1182 against various diseases in AICRP trials during 2014 and 15

Entries	MLB (score 1-5)		TLB (score 1-5)		C. Rot (score1-9)		FSR (score1-9)	
	Mean	Reaction	Mean	Reaction	Mean	Reaction	Mean	Reaction
QMHSC-1182	2.70	MR	2.75	MR	4.80	MR	4.60	MR
Madhuri (C)	2.95	MR	3.10	MS	4.70	MR	3.55	MR
WOSC (C)	3.40	MS	3.55	MS	5.15	MS	3.80	MR
Priya (C)	2.90	MR	2.80	MR	6.60	MS	3.80	MR
RES. (C)	1.70	R	1.80	R	2.40	R	-	-
SUS (C)	4.20	S	4.60	S	7.60	S	7.30	S

Rating Scale :

Turcicum leaf blight (TLB) and Maydis leaf blight (MLB)
1. 0-2.0 : Resistant (R)
2. 1-3.0 : Moderately Resistant (MR)
3. 1-4.0 : Moderately Susceptible (MS)
4. 1-5.0 : Susceptible (S)

Charcoal rot (C. Rot) and Fusarium stalk rot (FSR)
1. 0-3.0 : Resistant (R)
3. 1-5.0 : Moderately Resistant (MR)
5. 1-7.0 : Moderately Susceptible (MS)
7. 1-9.0 : Susceptible (S)

Table 6. Performance of sweet corn hybrid QMHSC-1182 against stem borer (*Chilo partellus* Sw.) under natural infestation

Entry	*Kharif*-2013		*Kharif*-2014		*Kharif*-2015	
	Mean LIR	Reaction	Mean LIR	Reaction	Mean LIR	Reaction
QMHSC-1182	1.4	R	2.3	R	1.9	R
Madhuri (C)	1.5	R	2.4	R	2.1	R
Priya (C)	1.9	R	2.9	R	1.5	R

gave 11583 Kg ha^{-1} (Table 4) which was 93.05 and 99.12 percent higher than the checks Madhuri (6000 Kg ha^{-1}) and Priya (5817 Kg ha^{-1}), respectively.In adaptive trials on farmers field QMHSC-1182 gave 13337 Kg ha^{-1} green fodder yield which was 18.81 percent higher than the check Madhuri (11225 Kg ha^{-1}).

Pests and Diseases : Sweet corn hybrid QMHSC-1182 was resistant to stem borer (*Chilo partellus* Sw.) under field condition during *Kharif*-2013-2015; however it was moderately resistant to resistant in artificial infestation condition (Table 6, 7) This hybrid was found moderately resistant to diseases *viz*; Maydis leaf blight, Fusarium stalk rot, Turcicum

Table 7. Performance of sweet corn hybrid QMHSC-1182 against stem borer (Chilo partellus Sw.) under artificial infestation in Advance Varietal Trial (AVT) during *Kharif* 2015

Entry	Zone wise Leaf Injury Rating							
	Zone-II		Zone-III		Zone-IV		Zone-V	
	LIR	Reaction	LIR	Reaction	LIR	Reaction	LIR	Reaction
QMHSC-1182	3.5	MR	2.2	R	5.5	MR	1.3	R
Madhuri (C)	4.0	MR	3.1	MR	5.7	MR	3.7	MR
Priya (C)	3.8	MR	3.3	MR	6.2	S	9.0	S

Scale:
i) 1.0-3.0 : Resistant (R)
ii) 3.1-6.0 : Moderately Resistant (MR)
iii) 6.1-9.0 : Susceptible (S)

Rating: 1 = Apparently healthy plant
2 to 8 = Intermediate foliar injury
9 = Dead-heart (Complete failure of plant)

Table 8. Brix (%) Performance of sweet corn hybrid QMHSC-1182 in State Agricultural University (SAU) Trial at Parbhani during *Kharif*-2015

Entry	Name of Company	Brix (%)
NWSC No.02	Nong Woo Seed (I) Pvt.Ltd.Bengalore	15.00
Indam-003	Indo-American Hybrid seeds(I) Pvt. Ltd., Pune	15.44
QMHSC-1182	AICRP, Kolhapur.	14.89
Mishti (c)	Nuziveedu Seeds Pvt. Ltd.	14.94
S-75 (c)	Syngenta India Ltd.	14.39
Madhuri (c)	AICRP, Hyderabad.	16.11
Priya (c)	--do---	17.28
SE±	0.33	
C.D. at 5%	1.02	
CV %	2.47	

Table 9. Performance of sweet corn hybrid QMHSC-1182 for Organoleptic test

Entry	Organoleptic properties of sweet corn				
	Colour	**Tender-ness**	**Taste (sweetness)**	**Grain shape**	**Overall acceptability**
QMHSC-1182	Yellow	Soft	Sweet	Flat	Like moderately
Madhuri (C)	Yellow	Soft	Medium sweet	Flat	Neither like nor dislike
Priya (C)	Yellow	Medium soft	Medium sweet	Flat	Like moderately
Private hybrid (C)	Yellow	Soft	Sweet	Flat	Like moderately

leaf blight, Banded leaf and sheath blight, and Charcoal rot during *Kharif* season (Table 5).

Quality Characters : Organoleptic test of sweet corn hybrid QMHSC-1182 was conducted as per the nine point hedonic Scale (Amerine *et al.* 1965) during 2015-16 and this hybrid was moderately liked for overall acceptability. The grain was yellow, flat, soft and sweet (Table 9). This hybrid recorded 14.89% brix reading (Table 8).

The green cobs of this hybrid are ready to harvest within 80-85 days, the crop growth is semi-spreading, shrunken grain at maturity (15-18 g 100 seeds^{-1}), responsive to high fertilizer dose (180:90:60, N:P:K Kg ha^{-1}) at close spacing of 60 x 20 cm performing high yield (Table 2, 3). Being a high yield potential and considered resistance to turcicum leaf blight and stem borer (*Chillo partellus* Sw.), the sweet corn hybrid QMHSC-1182 was identified for release during 2016 for sweet corn cultivation in Maharashtra. (Anonymous,2016.)

Acknowledgement

The authors are thankful to all concerned scientists and the technical staff who helped in sreeening and evaluation of this hybrid in various trials conducted in different locations.

References

Anonymous. 2016. Report of the Joint Agresco held at Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. 28-30th May 2016.

Anonymous. 2016. Proceeding of 49th State Seed Sub Committee meeting, Govt. of Maharashtra held on 7/12/2016 at Nagpur.

Panse, V. G. and Sukhatme, P. V. 1967. Statistical Methods for Agricultural Workers. ICAR Publ. New Delhi (India).