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**Application of Maize Mutation Types Induced by Space Environment
to Plant Genetic and Breeding**

In authors previous paper it is has been described that the space environment has significant the effects on maize hereditary variation and had obtained the different mutation types (MNL 2005, 79:3, 2006, 80:2; 2007, 81:2). This paper deals with the application of three mutation types to the plant genetic and breeding which are based on the precision scheme of heterotic breeding of the space inducement. 7 mutants belong in three mutation types, i. e. the plant height, ear length and grain types etc, mutation types ,are used as main experimental materials. 19 new lines are developed, and 6 pairs of the superior genetic materials are developed and screened with use for researching the machinery and regularity of space inducement. Among them 11 elite lines (See Table 1-2, Fig. 1) containing the 25%-50% blood relative of space inducement are applicated to combined 7 superior hybrids, they have already adopted the regional and yield potential trail for national or province (city, autonomous region) tests and (or) obtained the examination and approval of crop varieties examine and approve committee, to award certificates of new variety right, respectively. The accumulate total for spread areas per year had reached the more 0.8 million Mu (0.053 million ha.). In below papers, ought to discussion the problems of rise combing ability, biochemical component quality for space induced lines and hybrids and construction of the breeding engineering system for space inducement. The prospective on research progress for flight aerospace engineering breeding also ought to mention.

Table 1.The characters and properties for space Environment induced maize mutant

Name Original No. Item	Mut2	Mut5	Mut6	Mut7	Mut8	Mut9	Mut12
	Yi01-4-1 Sp2-3	U8112 Sp3-4	U8112 Sp3-2	U8112 Sp3-3	Me141 SP3-1	Me141 Sp3-2	Zi24 Sp4-5
Plant height (cm)	182.0	157.0	214.0	189.0	220.1	227.3	190.5
Ear height (cm)	75.1	50.1	93.0	82.5	97.2	100.1	88.7
Length of the leaf at the ear site (cm)	75.6	71.3	74.5	70.1	85.1	87.1	74.0
Width of the leaf at the ear site (cm)	9.1	10.0	9.4	9.5	10.0	10.1	10.0
Tassel length (cm)	50.0	43.1	46.2	45.1	47.2	52.6	41.0
Tassel branch number	15.0	9.0	15.1	15.2	15.3	14.0	8.5
Leaf number	20	21	21	21	22	22	21
Ear Length (cm)	13.9	14.1	20.2	19.1	17.1	18.5	17.0
Ear diameter (cm)	4.8	4.7	5.0	4.7	5.0	5.2	4.4
Number of kernel row	12	14~16	14	14	16	16	14
Kernel number of each row	33.0	31.0	32.0	33.0	34.2	32.3	35
Weight of 100 kernel (g)	27.1	22.1	24.8	22.7	24.7	28.5	19.8
Each ear weight	120.1	105.7	143.0	130.0	172.4	174.0	135.2
Kernel weight per ear	99.9	87.2	120.3	107.5	141.8	142.9	116.3
Ear form, kernel type	Spindle SD	Spindle SD.D	Cycle SF.	Cycle F.	Cycle SF.	Cycle SD.SF	Cycle wx
Cob, Kernel color	W. Y.	W. Y.	W. Y.	W. Y.	W. Y.	W. Y.	R. W.
Day from seeding to kernel maturing	55	57	57	57	64	64	58
Length for leaf-blade of husk top(cm)	No	No	No	No	No	No	No
Length of ear handle(cm)	6.0	6.0	6.0	6.3	6.9	6.4	5.0
Ear number per plant	1~2	1	1	1	1~2	1~2	1~2
Level of leaf-blade erect	Erect	Erect	Erect	Erect	General	General	More erect
Resistance to E.turcicum & B.maydis	HR	HR	HR	HR	HR	HR	R
to P.inflatum,P.aphanidermatum, F.moniliforme & F.graminearum	MR	HR	HR	HR	HR	HR	MR
to S.holci-sorghii	HR	MR	MR	MR	HR	HR	HR
to P.sorghii & P.polysora	HR	HR	HR	HR	HR	HR	HR

Table 2. The characters and properties for the maize mutants came from inbred lines

Name	Yio1-4-1	Zi:24	U8112	Me141
Item				
Plant height (cm)	143.1	191.5	190.0	181.5
Ear height (cm)	41.2	90.2	82.8	81.2
Length of the leaf at the ear site (cm)	67.2	75.2	41.8	88.6
Width of the leaf at the ear site (cm)	7.0	10.1	9.4	9.4
Tassel length (cm)	41.5	42.1	65.4	51.3
Tassel branch number	10.8	10.5	8.9	11.1
Leaf number	20	21	21	22
Ear Length (cm)	11.2	16.7	16.7	12.8
Ear diameter (cm)	3.5	4.2	4.6	5.1
Number of kernel row	12	14	12	18
Kernel number of each row	22	36	28	22
Weight of 100 kernel (g)	19.1	24.0	21.5	25.0
Each ear weight	61.0	145.7	84.0	123.4
Kernel weight per ear	50.1	124.3	71.0	101.0
Ear form ,kernel type	Cycle. SF	Spindle. SDSF	Cycle. D	Cycle. SD
Cob, Kernel color	W. Y.	R. W.	W. Y.	W. YW
Day from seeding to kernel maturing	57	58	60	69
Length for leaf-blade of husk top(cm)	No	No	No	No
Length of ear handle(cm)	5.0	5.1	6.0	6.3
Ear number per plant	1~2	1~2	1	1~2
Level of leaf-blade erect	Erect	More erect	Erect	General
Resistance to <i>E.turcicum</i> & <i>B.maydis</i>	S	MR	MR	HR
to <i>P.inflatum</i> , <i>P.aphanidermatum</i> , <i>F.moniliforme</i> & <i>F.graminearum</i>	MR	MR	HR	HR
to <i>S.holci-sorghii</i>	HR	HR	MR	HR
to <i>P.sorghii</i> & <i>P.polysora</i>	HR	HR	HR	HR

Fig.1. Breeding sketch map for 11 of inbred lines by using multiple cross and backcross methods

<p>1.Me12 {[(Mo17 × Zi330) ⊗ × Y78599 ⊗] ⊗ S6 variation plant × Mut5} ⊗ S5 × (PHG analogous plant ⊗ × NRRSP I b analogous plant ⊗)</p> <p>F2 pop. ⊗, Selected, Testcross... → S8 (Me12)</p>	<p>2.XH3 [HZGC1 ⊗ S5 × (HZGC2 analogous plant ⊗ × HZPC2 analogous plant ⊗)]</p> <p>⊗ S4 × (Mut4 × NRRSP I a analogous plant ⊗) ⊗</p> <p>F2 pop. ⊗, Selected, Testcross... → S7 (XH3)</p>
<p>3.Met88 [(NRRSP I b ⊗ × Me8) ⊗ S3 × SW5P analogous plant ⊗ S3]</p> <p>⊗ S3 × Mut8</p> <p>F2 pop. ⊗, Selected, Testcross... → S7 (Met88)</p>	<p>4.Mv02 [(Q1621 × Y78599 ⊗) ⊗ S3 × NRRSP I a ⊗ S3]</p> <p>⊗ S3 × Mut7</p> <p>F2 pop. ⊗, Selected, Testcross... → S7 (Mvo2)</p>
<p>5.Me196 [(Ye3189 variation plant × Ye478) ⊗ S3 × NRRSP I b analogous plant ⊗]</p> <p>⊗ S3 × Mut8</p> <p>F2 pop. ⊗, Selected Testcross... → S8 (Me196)</p>	<p>6.Met883 [(NRRSP II b ⊗ × Me8) ⊗ S3 × (SW3 ⊗ × SW3P analogous plant ⊗)]</p> <p>⊗ S3 × Mut8</p> <p>F2 pop. ⊗, Selected, Testcross... → S8 (Met883)</p>
<p>7.Me06 {[(Q1621 × Y78599 ⊗) ⊗ S3 × NRRSP II a ⊗ S3]</p> <p>⊗ S3 × Mut6</p> <p>F2 pop. ⊗, Selected, Testcross... → S8 (Me06)</p>	<p>8.Met81 [(NRRSP I b ⊗ × Me81) ⊗ S3 × SW5P analogous plant ⊗ S3]</p> <p>⊗ S3 × Mut9</p> <p>F2 pop. ⊗, Selected, Testcross... → S7 (Met81)</p>
<p>9.Me05 [(Q1621 × Y78599 ⊗) ⊗ S3 × NRRSP I a ⊗ S3]</p> <p>⊗ S3 × (Ki45 × Mo17 variation plant ⊗ S3)</p> <p>⊗ S3 × Mut5</p> <p>F2 pop. ⊗, Selected, Testcross... → S8 (Me05)</p>	<p>10.Me07 [(Q1621 × Y78599 ⊗) ⊗ S3 × NRRSP I a ⊗ S3]</p> <p>⊗ S3 × (Ki21 × M017 variation plant ⊗ S3)</p> <p>⊗ S3 × Mut7</p> <p>F2 pop. ⊗, Selected, Testcross... → S8 (Me07)</p>
<p>11.Me887wx Li502wx F2 pop. ⊗ S1 variation plant ⊗ S3</p> <p>⊗ S3 × ThaiWwx pop. ⊗ S3</p> <p>⊗ S3 × Mut12wx</p> <p>F2 pop. ⊗, Selected, Testcross... → S7 (Me887wx)</p>	