

Seed size and its relationship with crop establishment, productivity and nutritive value in genotypes of maize for silage

C. Pérez M.¹, M.R. Tovar G.^{2*}, G. García¹, A. Carballo¹, G. Mendoza¹, T. Vásquez¹, F. González¹ and M. Crosby¹
¹Colegio de Postgraduados, ²INIFAP-CEVAMEX, México, Email: claudiatlaxcala@yahoo.com.mx

Keywords: physical quality, maize genotypes, yield, nutritional value

Introduction For a high dry matter (DM) yield of forage maize an adequate population of plants is required, which is related to germination, vigour, and seed size (Ellis, 1992). The objective of the present study was to investigate seed size and its relationship to establishment, productive and nutritional potential of silage maize, which has not before been reported in the literature.

Materials and methods The study was done in 2002 with nine genotypes at the Colegio de Postgraduados and the Experimental Station Valle de Mexico (INIFAP) (PECSL and PECT. Research consisted of two phases 1) the physical seed quality and 2) field establishment, production and nutritional value of maize silage. The design was a randomised block with four replications and a factorial array of treatments. Physical quality of the seed was determined in terms of shape, size, flat large and medium, length (LS), width (AS) and thickness (ES). The percentage establishment was determined whilst the emergency remained constant at both sites. The harvest was done at the silage stage (30-35 % DM of the whole plant). The variables recorded were: female flowering (FF), protein yield (CPY) and digestible dry matter yield (DDMY), crude protein (CP) and in vitro DM digestibility (IVDMD).

Results and discussion Significant ($P \leq 0.001$) differences among genotypes were observed in all the variables, but for seed size only the physical and nutritional quality and PCY were significant (Table 1).

Table 1 Comparison of means for physical quality variables, productivity and nutritional value in genotypes of maize silage

Genotype	LS (cm)	WS (cm)	TS (cm)	PECT (%)	PESL (%)	CPY (t/ha)	DDMY (t/ha)	CP (%)	IVDMD (%)
H157	1.1	0.8	0.3	89.6	89.1	1.8	15.6	7.6	64.4
H135	1.2	0.8	0.4	89.5	77.9	2.0	16.4	8.5	71.7
A791	1.1	0.8	0.4	91.1	84.0	1.8	12.7	8.0	56.7
VS2000	1.4	0.7	0.4	87.1	83.6	1.6	13.4	8.1	65.8
Campeón	1.7	0.8	0.4	94.0	92.1	2.1	16.8	8.8	71.5
Promesa	1.2	0.8	0.4	95.9	92.4	1.8	13.9	8.7	68.3
HS2	1.2	0.7	0.4	94.8	94.0	1.8	16.6	7.9	70.7
VS22	1.3	0.7	0.4	90.9	92.0	1.7	14.1	8.4	70.2
H358	1.0	0.7	0.4	85.6	52.1	1.7	14.6	8.1	70.9
Average	1.3	0.7	0.4	90.9	84.1	1.6	13.4	7.4	61.0
Significance	**	**	**	**	**	**	**	**	**
DMSH	0.07	0.07	0.04	9.7	10.2	0.23	2.09	0.08	1.08

** P < 0.001

Campeón, VS22 and VS2000 had the best physical seed quality. The greater percentage of establishment at both sites were obtained with Promesa, HS2, Campeón and VS22. Cultivars H157, H135, Campeón and HS2 had the highest CPY and DDMY. Campeón, H135 and VS22 showed the highest CP concentrations. H135, Campeón, H358, HS2 and VS22 had the highest IVDMD. On the other hand, LS and FF were negatively correlated, indicating that genotypes with greater seed size are maturing earlier (FF) as was the case with cv. VS22. Likewise, the LS had the highest correlation with CP ($r = 0.78$) and IVDMD ($r = 0.67$). This result agrees partially with Ries & Everson (1973) who reported a positive association between CP and seed size in wheat.

Conclusions Genotype affects establishment, productivity and nutritional value of maize silage. The seed size influences the physical and nutritional quality. Genotypes with the best physical seed quality were Campeón, VS22 and VS2000, whilst in field establishment Campeón, HS2 and Promesa were superior. Campeón, H135, HS2, H157, VS22 and H358 were the best in productivity and nutritional value.

References

- Ellis, R.H. (1992). Seed and seedling vigour in relation to crop growth and yield. *Plant Growth Regulation*, 11, 249-255.
- Ries, S.K., and E.H. Everson (1973). Protein content and seed size relationships with seedling vigour of wheat cultivars. *Agronomy Journal*, 65, 884-181.
- S.A.S. (2000). Statistical Analysis System Institute. Inc. Cary, NC. USA.