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Yunwen Wang

*China Agricultural University, China*

Jianguo Han

*China Agricultural University, China*

Manli Li

*China Agricultural University, China*

Jiefeng Sun

*Qingdao Haiyuan Turf Co. Ltd., China*

Yong He

*Qingdao Haiyuan Turf Co. Ltd., China*

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## Different seed dormancy levels imposed by tissues covering the Caryopsis in strains of *Zoysiagrass* (*Zoysia japonica* Steud.)

Yunwen Wang<sup>1</sup>, Jianguo Han<sup>1</sup>, Manli Li<sup>1</sup>, Jiefeng Sun<sup>2</sup>, Yong He<sup>2</sup>

<sup>1</sup>Department of Grassland Science, College of Animal Science and Technology, China Agricultural University, Beijing 100094, China, E-mail: wyyw@cau.edu.cn, <sup>2</sup>Qingdao Haiyuan Turf Co. Ltd, Jiaozhou, 266300, China

**Key words:** zoysiagrass, seed dormancy, glume and lemma, water permeability

**Introduction** Zoysiagrass caryopses are covered with a waxy glume and inner lemma, these structures are the main factors restricting zoysiagrass seed germination (Forbes et al., 1948; Xu, 2005). The objective of this study was to explore whether the outer structures were significantly different among strains with variation in seed dormancy.

**Materials and methods** Two domesticated strains including *Zoysia green* (*Z. japonica* var. *pollida* Nakai ex Honda) and *Zoysia brown* (*Z. japonica* Steud.), and a control of wild *Z. japonica* population were cultivated at Jiaozhou City, Shandong Province (36°10' N, 119°46' E, altitude 50m). The area of each strains measured 22.0 m by 70.0 m, there were tree belts with 3-5 m high and more than 50 m wide as isolation border between each strains, field management methods were same. Two to five kilogram seeds for each strain were collected and a preliminary germination test was conducted in 2005 and 2006, respectively. Seed viability was measured by tetrazolium testing. Intact seeds of three strains were cut in cross-section to remove only the tip ends (tip cutting) of the glume, lemma and the caryopsis at a point distal to the embryo or only the base ends (basal cutting) of the same tissues being careful not to cut the embryo. Bare caryopses obtained by careful removal of the glume and lemma by hand (Xu, 2005). The arcsine transformation was applied in the analysis of variance related to the germination percentages.

**Table 1** Final germination percentage and seed viability for two domesticated strains and wild type collected in 2005 and 2006.

Seed strain	FGP (%)		Seed viability (%)	
	2005	2006	2005	2006
Zoysia green	68 <sup>a*</sup>	55 <sup>a</sup>	78 <sup>ab</sup>	84 <sup>a</sup>
Zoysia brown	46 <sup>b</sup>	44 <sup>b</sup>	80 <sup>a</sup>	83 <sup>a</sup>
Wild type	32 <sup>c</sup>	33 <sup>c</sup>	75 <sup>bc</sup>	81 <sup>a</sup>

\* Note: Different letters in the same column means significantly different ( $p < 0.05$ ) according to the Duncan's Multiple Range Test.

**Table 2** Final germination percentage (%) of seed for three tested zoysiagrass strains with different treatments after 28 d of germination test.

Seed strain	Intact seed	Tip cutting	Basal cutting	Bare Caryopsis	LSD <sub>0.05</sub>
Zoysia green	67	67	71	75	3.9
Zoysia brown	46	57	64	69	4.9
Wild type	42	59	57	60	8.8
LSD <sub>0.05</sub>	3.8	3.2	12.6	6.3	

**Results** There were significant differences ( $p < 0.05$ ) in final germination percentage (FGP) among three tested seed strains in both years consistently (Table 1). It indicated there was a variation in seed dormancy phenotype among these strain. *Zoysia green* strain showed the lowest seed dormancy. Both cut-seed treatments and removal of the outer structure significantly increased FGP compared with the intact seeds. Seeds with the base end removed (basal cutting) had a higher FGP than those with the tip end removed (tip cutting), except wild type seed (Table 2). The results of experiment suggested that seed dormancy of zoysiagrass is mainly caused by the covering tissues, moreover, the covering structures at the base end play a more important role in preventing germination than tip part, due to its closer proximity to the embryo. *Zoysia green* strain showed a lesser physical restricts imposed by its covering structures involving seed dormancy than *Zoysia brown* strain and wild type. Apart from the physical restricts, physiological dormancy still occurred in caryopsis. Caryopsis of *Zoysia green* had the lowest inhibitors, but the wild type had the highest.

**Conclusions** *Zoysia green* strain is characterized as the lowest seed dormancy, involved with a lesser physical restrict and a low content of physiological inhibitors in seed. The phenotype variation in seed dormancy among zoysiagrass strains is largely classified into a coat-imposed dormancy.

### References

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