

Factors Affecting Germination of Herbicide-Resistant Schoenoplectus juncooides with the als Gene Pro197-Thr and Trp574-Leu Substitution

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출처 (Source)	한국농약과학회 학술발표대회 논문집 , 2019.4, 183-184(2 pages)
발행처 (Publisher)	한국농약과학회 The Korean Society Of Pesticide Science
URL	http://www.dbpia.co.kr/journal/articleDetail?nodeId=NODE08010504
APA Style	Cho Kwang Min, Wei Qiang Jia, Ok Jae Won, Hyun Sung Lim, BotirKhaltov, Kee Woong Park (2019). Factors Affecting Germination of Herbicide-Resistant Schoenoplectus juncooides with the als Gene Pro197-Thr and Trp574-Leu Substitution. 한국농약과학회 학술발표대회 논문집, 183-184
이용정보 (Accessed)	이화여자대학교 203.255.***.68 2020/05/18 04:01 (KST)

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Factors Affecting Germination of Herbicide-Resistant *Schoenoplectus juncooides* with the *als* Gene Pro197-Thr and Trp574-Leu Substitution

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In Korea, *Schoenoplectus juncooides* has been first identified as a resistance to ALS-inhibitors in 2001. Since then, a great number of studies were focused on the monitoring and mechanism of resistance in *S. juncooides*. By contrast, the fitness including germination, growth, reproductive capacity, and competitiveness of plant was not investigated in the ALS inhibitors-resistant *S. juncooides*. In the present study, we investigated the germination rate of the ALS inhibitors-resistant *S. juncooides* associated with *als* gene mutation at the position of Pro197-Thr or Trp574-Leu. First, the seed germination of the ALS inhibitors resistant (GR and WR) and susceptible (HS) biotypes was compared at 35/15°C, 25/15°C, and 15/15°C (day/night) in germination chambers. Fifty seeds of each biotype were put on Whatman No. 2 filter papers in Petri dishes (φ :9 cm, H:1.5 cm) with adding 5 ml of distilled water. The germinated seeds were counted 24 hours after sowing and the germination rate was calculated for each biotype. The seeds of the WR, GR, and HS biotypes germinated more than 88% at 35/15°C and 25/15°C, and lower than 35% at 15/15°C. The maximum cumulative germination of HS biotypes was similar as WR biotypes, but 10% more than the GR biotype at 35/15°C. In contrast to the result at 25/15 and 15/15°C, the maximum cumulative germination of HS biotype was slightly less than that of WR biotype, and greater than that of GR biotype. Second, the seed germination of the GR, WR and HS biotypes was compared at 35/15°C incubator under light and dark conditions. Experimental process and data

analysis were similar as described above. The maximum cumulative germination of HS biotype was different with the WR and GR biotypes at the light condition, the differences were 7.5% less than the WR biotype and 4.0% more than the GR biotype. At the dark condition, the maximum cumulative germination of the WR biotype was significantly greater than that of the HS and GR biotypes. These result indicated that the als gene mutation at the position of Trp574-Leu probably has positive effects on the fitness of phenotypes in *S. juncooides*, and als gene mutation at the position of Pro197-Thr probably has negative effects.

Keywords: ALS inhibitor, fitness, gene mutation, rock bulrush.