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Laboratory Culturing Media Influence on Ginseng Growth and Biocontrol Ability of *Pseudomonas fluorescens* strain GN100

Ginseng Research Division, National Institute of Horticultural and Herbal Sci., RDA
Y.-S Bae*, B.-Y. Yeom, S.-W. Kang and E.-H. Lee

계대 배양배지가 *Pseudomonas fluorescens* strain GN100의 인삼 생육촉진 및 뿌리썩음병 방제 활성에 미치는 영향

농촌진흥청 국립원예특작과학원 인삼특작부 인삼과 : 배영석*, 연병열, 강승원, 이응호

Objectives

Performance of plant growth promoting rhizobacteria for biocontrol of plant pathogens often shows inconsistency which may be caused by hostile environments such as abiotic or biotic stress. Part of the inconsistancy may also be due to the degeneration of biocontrol agents during storage or culturing. *P. fluorescens* strain GN100 was selected for a promising biocontrol agent to suppress ginseng root rot caused by *Cylindrocarpon destructans*. Previous studies showed that the strain was reduced its ability to suppress root rot by sub-culturing over 10 times on tryptic soy agar. The objectives of this study was to determine whether long-term repeated culturing of the biocontrol agent on a certain medium alters its ginseng growth and biocontrol ability to Cylindrocarpon root rot.

Materials and Methods

ㅇ **Media, and cultivation:** Media for *P. fluorescens* strain GN100 used were tryptic soy agar, nutrient agar, King's B medium, and soil extract agar. The strain kept on TSA was cultured repeatedly on each media over 20 times.

ㅇ **Ginseng growth and biocontrol of root rot:** Bacterial suspension of each medium-dependent isolates were made and one-year-old ginseng roots were placed in each bacterial suspension for 1 hr. Then, the roots were replanted in a ginseng field at the early April. Shoot emergence was recorded 2 month later and the incidence of root rot was examined 6 month later.

ㅇ **Rhizosphere population of bacteria.** Bacterial population on two-year-old ginseng roots 6 month after treatment was examined on King's B medium for fluorescent pseudomonads and on 1/10 strength tryptic soy agar for *Bacillus* sp. after heating of root samples at 80℃ for 30 min. All data were subjected to one way analysis of variance and means comparisons using Students' t (P=0.05).

Corresponding author : Yeoung-Seuk Bae E-mail : ysbae@rda.go.kr Tel : 043-871-5554

Results

All medium dependent isolates except for SEA-dependent isolate stimulated the emergence of ginseng shoot compared with the untreated control. However, the effect did not result in the promotion of ginseng root growth. Treatment of KB-dependent isolate showed the best effect on the growth of ginseng roots. Furthermore, treatment of KB-dependent isolate resulted in less incidence of Cylindrocarpon root rot than those of other treatments. Population density of fluorescent pseudomonads was the highest in the treatment of KB-dependent isolate, but *Bacillus* spp. in the treatment of NA-dependent isolate.

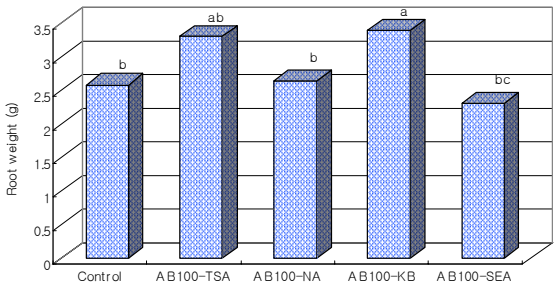

Fig. 1. Effect of medium dependent *Pseudomonas fluorescens* strain GN100 on the growth of ginseng root. The isolate wes continuously cultured on each medium over 20 times.

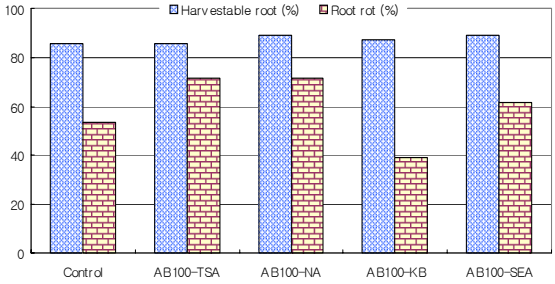

Fig. 2. Effect of medium dependent isolates on the incidence of Cylindrocarpon root rot in a field. One-year-old ginseng roots treated with or without medium dependent GN100 were transplanted at early April and harvested at 6 month later.

Table 1. Population density of fluorescent pseudomonads and *Bacillus* on the rhizosphere of ginseng plant when medium dependant isolates were applied to 1-year-old ginseng root

Treatment	Population density ($\times 10^3$ cfu/g · root)	
	Fluorescent pseudomonads	*Bacillus* spp.
Control	31.02(10.87)*	1.91(0.54)
TSA dependent AB100	29.22(11.52)	2.10(0.27)
NA dependent AB100	19.21(4.53)	5.60(1.89)
KB dependent AB100	37.30(15.28)	3.58(0.51)
SEA dependent AB100	25.99(2.93)	2.05(0.49)

*( ); standard error.