뿌리 분할방법을 이용한 콩 근류균 Fast grower 와 Slow grower 및 콩 품종간 상호작용

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Interactions of Soybean Cultivars with Fast- and Slow-Growing Soybean Rhizobia in a Split-root Growth System.

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접종시기 및 품종을 달리하여 콩 근류균 Fast grow (R. fredii)와 Slow grower(B. japonicum) 의 상호억제 또는 조장작용 여부 및 이들 반응의 품종간 차이를 구명코자 함.

1. 공시품종 : Lee, Peking
2. 접종균주 : Slow grower(S) - USDA110, Fast grower(F) - PRC205
3. 처리내용 : 최아종자 뿌리절단 접제후 (그림1)과 같이 재배
   - 파종 1주일후 1차접종, 2주후 2차접종

처리번호 Elbow	1	2	3	4	5	6	7	8	9	10
Side A	F^E	None	S^E	F^E	None	S^E	F^E	F^E	$-S^E$	$(S+F)^E$
Side B	S^D	S^D	S^D	F^D	F^D	F^D	F^E	S^E	S^E	$(S+F)^E$

실험결과 및 고찰

1. 콩품종 Lee의 경우 2차 접종 균주에 관계없이 USDA110 1차 접종시 생육이 양호하였다.
2. Peking은 PRC 205 1차 접종시 생육이 양호하였다.
3. Lee 품종에서는 1차 접종된 PRC205가 2차 접종된 USDA110의 근류착생에 큰 영향을 주지 않았다.
4. Peking의 경우 1차 접종된 2 균주 모두 2차 접종 부분의 근류착생을 억제하였다.
5. Fast 와 Slow grower 균주간의 상호작용은 품종에 따라 다소 달라질 것으로 사료되었다.

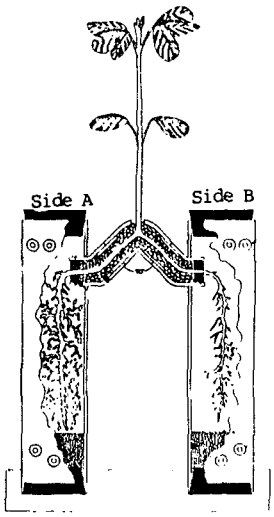

FIG. 1. Design of a split-root growth system

Table 1. Effect of different inoculation treatment with fast- and slow-growing soybean rhizobia on plant growth and nodule development of soybean cultivar "Lee" in a split-root growth system

Inoculation Treat.*		Nodule	Dry weight (mg/plant)				T/R ratio
Side 1(E)	Side 2(D)	Number	Nodule	Root(A)	Shoot(B)	Total	(B/A)
PRC 205	USDA 110	159	72	210	541	751	2.6
None	USDA 110	85	49	207	506	713	2.4
USDA 110	USDA 110	93	125	224	1084	1308	4.8
PRC 205	PRC 205	35	16	280	604	884	2.1
None	PRC 205	29	10	309	694	1003	2.2
USDA 110	PRC 205	74	123	246	1140	1386	4.7
L.S.D. (5%)		37	30	71	319	364	0.8

* ( ) Indicates early (E) and delayed (D) inoculation

Table 2. Effect of different inoculation treatment with fast- and slow-growing soybean rhizobia on plant growth and nodule development of soybean cultivar "Peking" in a split-root growth system

Inoculation Treat.*		Nodule	Dry weight (mg/plant)				T/R ratio
Side 1(E)	Side 2(D)	Number	Nodule	Root(A)	Shoot(B)	Total	(B/A)
PRC 205	USDA 110	25	47	202	522	725	2.6
None	USDA 110	25	18	168	320	488	1.9
USDA 110	USDA 110	15	37	164	378	542	2.3
PRC 205	PRC 205	9	49	189	522	711	2.9
None	PRC 205	18	23	185	355	539	1.9
USDA 110	PRC 205	14	36	150	353	503	2.3
L.S.D. (5%)		10	16	52	142	176	0.8

* ( ) Indicates early (E) and delayed (D) inoculation

Table 3. Competition of fast- and slow-growing soybean rhizobia on "Lee" soybean cultivar in a split-root growth system

Inoculation Treat.*		Nodule	Dry weight (mg/plant)				T/R ratio
Side 1	Side 2	Number	Nodule	Root(A)	Shoot(B)	Total	(B/A)
PRC 205	PRC 205	34	14	271	561	832	2.1
PRC 205	USDA 110	104	143	276	1235	1511	4.5
USDA 110	USDA 110	128	160	271	1377	1648	5.1
110+205	110+205	105	142	263	1262	1525	4.8
L.S.D. (5%)		37	30	NS**	319	364	0.8

* ( ) Indicates early (E) and delayed (D) inoculation

** Not Significant at p = 0.05

Table 4. Competition of fast- and slow-growing soybean rhizobia on "Peking" soybean cultivar in a split-root growth system

Inoculation Treat.*		Nodule	Dry weight (mg/plant)				T/R ratio
Side 1	Side 2	Number	Nodule	Root(A)	Shoot(B)	Total	(B/A)
PRC 205	PRC 205	19	74	175	644	819	3.7
PRC 205	USDA 110	16	52	163	556	719	3.7
USDA 110	USDA 110	18	42	155	423	584	2.7
110+205	110+205	14	49	191	559	750	3.0
L.S.D. (5%)		NS**	16	NS	142	176	0.8

* ( ) Indicates early (E) and delayed (D) inoculation

** Not Significant at p = 0.05

Table 5. Effect of fast- and slow-growing soybean rhizobia treatment on secondary nodule development of soybean cultivar "Lee" in a split-root growth system

Inoculation Treat.*		No. of Nodules		Nodule Mass (mg)		Root Weight (mg)	
Side 1(E)	Side 2(D)	Side 1	Side 2	Side 1	Side 2	Side 1	Side 2
PRC 205	USDA 110	0	159	0	72	106	110
None	USDA 110	0	85	0	49	83	124
USDA 110	USDA 110	89	1	120	2	139	76
PRC 205	PRC 205	27	8	13	3	159	122
None	PRC 205	0	29	0	10	122	187
USDA 110	PRC 205	74	0	123	0	169	102
L.S.D. (5%)		24	33	25	31	44	47

* ( ) Indicates early (E) and delayed (D) inoculation

Table 6. Effect of fast- and slow-growing soybean rhizobia treatment on secondary nodule development of soybean cultivar "Peking" in a split-root growth system

Inoculation Treat.*		No. of Nodules		Nodule Mass (mg)		Root Weight (mg)	
Side 1(E)	Side 2(D)	Side 1	Side 2	Side 1	Side 2	Side 1	Side 2
PRC 205	USDA 110	14	12	39	8	103	100
None	USDA 110	0	25	0	18	89	79
USDA 110	USDA 110	15	1	36	1	85	79
PRC 205	PRC 205	7	2	46	3	86	103
None	PRC 205	0	18	0	23	86	98
USDA 110	PRC 205	12	2	31	4	82	68
L.S.D. (5%)		11	10	22	17	NS**	NS

* ( ) Indicates early (E) and delayed (D) inoculation

** Not Significant at p = 0.05

Table 7. Competition of fast- and slow-growing soybean rhizobia treatment on "Lee" soybean cultivar in a split-root growth system

Inoculation Treat.*		No. of Nodules		Nodule Mass (mg)		Root Weight (mg)	
Side 1(E)	Side 2(D)	Side 1	Side 2	Side 1	Side 2	Side 1	Side 2
PRC 205	PRC 205	17	17	7	7	133	137
PRC 205	USDA 110	0	104	0	143	104	172
USDA 110	USDA 110	63	57	77	83	116	155
110+205	110+205	51	54	67	75	119	144
L.S.D. (5%)		24	33	25	31	NS**	NS

* Both sides are inoculated at the same time

** Not Significant at p = 0.05

Table 8. Competition of fast- and slow-growing soybean rhizobia treatment on "Peking" soybean cultivar in a split-root growth system

Inoculation Treat.*		No. of Nodules		Nodule Mass (mg)		Root Weight (mg)	
Side 1(E)	Side 2(D)	Side 1	Side 2	Side 1	Side 2	Side 1	Side 2
PRC 205	PRC 205	6	14	22	52	86	89
PRC 205	USDA 110	11	5	37	15	98	65
USDA 110	USDA 110	10	8	22	20	78	77
110+205	110+205	7	7	29	20	93	97
L.S.D. (5%)		NS**	NS	NS	17	NS	NS

* Both sides are inoculated at the same time

** Not Significant at p = 0.05