P13. 담수직파에 적합한 벼 종자 펠렛용 성형재료 및 접착제 선발

김석언* · 유수남** · 최영수** · 이성춘***

*전남농업기술원, **전남대학교, ***순천대학교

Selection of Suitable Coating Materials and Binders for Pelleting Rice Seed to Direct wet Seeding

Suk-wean Kim, Soo-nam Yoo, Yeong-soo Choi, Sheong-Chun Lee

*Chonnam Agriculture Research and Extension Services, Naju 520-830, Korea

**College of Agriculture, Chonnam National University, Kwangju 500-757, Korea

***College of Agriculture, Suncheon National University, Suncheon 540-742, Korea

실험목적

담수직파재배에 펠렛종자를 이용할 경우 필요한 펠렛 제조성, 기계적 강도, 파종후 발아 및 입모가 양호한 벼종자 펠렛용 성형재료 및 접착제를 선발하고자 함.

재료 및 방법

○ 실험재료

- 실험품종 : 동안벼
- 펠렛제조기 : 회전롤러식 압축성형 펠렛기(전남대학교 농공학과 고안, 제작)
- 펠렛용 성형재료 : 연곡통 식양토의 붉은색 산흙(YSCL), 덕평통 미사질양토의 논흙(DSSL), 포승통 미사질양토의 간척지흙(PSSL)
- 접착제 : 아라비아고무 1, 5, 10% 수용액, 젤라틴 1, 2, 3% 수용액

○ 실험방법

- Breaking time은 수심 3cm의 포트에 펠렛종자를 넣어 분단위로 조사.
- 펠렛성형재료간 볍씨 발아를 보기 위해 재료를 플라스틱 box에 넣고 담수심 2cm, 볍씨 파종심도 0, 0.5cm로 하여 25℃의 발아상에서 조사.
- 펠렛성형재료간 pH는 포트에 재료를 넣고 담수하여 0.5cm이내 깊이의 재료를 채취하여 측정하였고, Eh는 0.5cm 지점에서 측정.
- 유리병에 펠렛종자를 넣고 5배 부피의 증류수를 가하여 펠렛종자의 pH와, Eh 변화를 측정하였고 Tb(Turbidity)변화는 달관조사.
- 펠렛종자의 발아와 출아 · 입묘를 조사.

실험결과

○ 펠렛종자의 모양형성과 경도, 담수조건에서 붕괴시간을 고려할 때 가장 적합한 펠렛성형재료는 YSSL 이었고 접착제는 아라비아고무 10%이었다.

○ YSSL은 발아에 적합한 pH와, Eh를 보였다.

○ YSSL과 아라비아고무 10%로 만든 펠렛종자(PDS)의 침종물 pH와 Eh 및 Tb는 가장 양호하였다.

○ PDS는 건조종자보다도 발아 및 입묘가 좋았고 파종심도는 0.5cm이내가 좋았으며 입묘도복도 발생하지 않았다.

Table 1. The characteristics of pellet seeds with the different material and binder.

Material†	Binder	Pellet shape†	Hardness (kg/cm²)	Remark	Breaking time (Min.)
YSCL	Distilled water	+	0.20 d	Rough	1 i
	Gelatine 1%	++	0.22 d	Good	2 i
	Gelatine 2%	+++	0.24 d	Very good	5 i
	Gelatine 3%	+++	0.80 d	Very good	Over 240 a
	Arabic gum 1%	+	0.79 d	Rough	2 i
	Arabic gum 5%	++	8.5 cd	Good	23 h
	Arabic gum 10%	+++	300 b	Very good	107 e
DSSL	Distilled water	++	1.4 d	Good	21 h
	Gelatine 1%	+++	1.6 d	Very good	25 h
	Gelatine 2%	+++	1.8 d	〃	146 c
	Gelatine 3%	+++	7.0 cd	〃	Over 240 a
	Arabic gum 1%	++	3.1 d	Good	94 f
	Arabic gum 5%	+++	16.0 d	Very good	Over 240 a
	Arabic gum 10%	+++	700 a	〃	Over 240 a
PSSL	Distilled water	+++	1.1 d	〃	23 h
	Gelatine 1%	+++	2.0 d	〃	82 g
	Gelatine 2%	+++	3.5 d	〃	107 e
	Gelatine 3%	+++	4.0 d	〃	210 b
	Arabic gum 1%	+++	2.8 d	〃	115 d
	Arabic gum 5%	+++	4.0 d	〃	Over 240 a
	Arabic gum 10%	+++	6.0 d	〃	Over 240 a

†YSCL : yoeongog series clay loam, DSSL : deogpyeong series silt loam, PSSL : Poseung series silt loam. †+++ Very smooth in surface, ++ Smooth, + Rough.
Means followed by the same letter in columns are not significantly different at the 5% level by DMRT.

Table 2. Germination percentage of the dry seed as affected by different pellet materials and soil depths at 25℃.

Pellet material†	Seeding depth (cm)	Germination percentage 5DAS†	6DAS	7DAS
YSCL	0	47 a	93 a	97 a
	0.5	17 c	60 b	73 b
DSSL	0	33 b	58 b	77 b
	0.5	0 d	40 c	73 b
PSSL	0	0 d	28 d	50 c
	0.5	0 d	8 e	24 d

†The same as table 1 †DAS : days after seeding.
Means followed by the same letter in a column are not significantly different at the 5% level by DMRT.

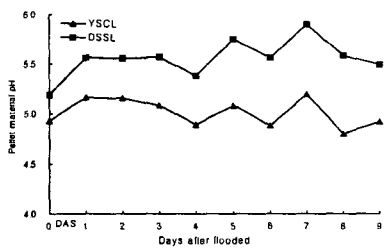

Fig. 1. Change in pH of pellet material under flooded after puddling (YSCL : yoeongog series clay loam, DSSL : deogpyeong series silt loam).

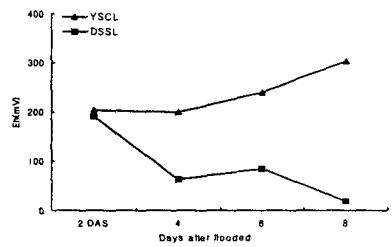

Fig. 2. Changes in Eh of pellet material under flooded after puddling (YSCL : yoeongog series clay loam, DSSL : deogpyeong series silt loam).

Table 3. pH, Eh and Tb of pellet seed after seeding in glass bottle.

Pellet materials	Binder		Days after seeding	pH	Eh	Tb†
YSCL	Gelatin	3%	1	5.89	143	M
	Arabic Gum	10%	1	4.56	254	M
	Distilled water		8	5.26	225	VC
	Gelatin	3%	8	5.25	220	C
	Arabic Gum	10%	8	4.93	140	C
DSSL	Distilled water		8	6.20	-173	M
	Gelatin	2%	8	6.77	-200	M
		3%	8	6.80	-230	VM
	Arabic Gum	1%	8	6.51	-90	M
		5%	8	5.93	-30	M
		10%	8	5.42	20	M

† Tb : turbidity, VC : Very crean, C : Crean, M : Mould, VM : Very mould.

Table 4. Character of germination and emergence of pellet seed in direct wet seeding.

Seed condition†	Germination (%)		Emergence (%)	
	8 days	14 days	8 days	14 days
Dry seed	57	60	45	55
DSPC	72	73	63	70
PDS	78	83	50	77
PSPC	82	85	67	77

†DSPC : Seed dried after seed disinfectant with prochloraz,
PDS : Seed pelleted with YSCL and A10,
PSPC : Seed pelleted with YSCL and A10 after seed disinfectant with prochloraz,.

Table 5. Time required for 50% germination and 50% emergence of pellet seed in direct wet seeding.

Seed condition†	Germination (days)	Emergence date (days)
Dry seed	7	9
DSPC	5	7
PDS	5	7
PSPC	5	6

† The same as table 4.

Table 6. Seedling stand and lodging degree by seeding depths of pellet seed at 25℃ in incubator.

Seed condition	Seeding depth (cm)	10 days after seeding Seedling stand (%)	Lodging of seedling stand (0~9)
Dry seed	0	70.0bcd	1
	0.5	73.3bcd	0
	1.0	66.7 cd	0
	2.0	63.3 d	0
	3.0	26.7 e	0
PDS	0	88.3 a	0
	0.5	78.3 ab	0
	1.0	76.7 bc	0
	2.0	65.0 d	0
	3.0	30.0 e	0

Means followed by the same letter in a column are not significantly different at the 5% level by DMRT.