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Priming 조건에 따른 벼 종자의 형태, 당 함량 및 α-amylase 활력의 변화

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Morphological Change, Sugar Content, and α-amylase Activity of Rice Seeds under Various Priming Conditions

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Objectives

Priming of seeds improves the overall germination rate and uniformity of growth and to reduces the time to germination. In this experiment, primed rice seeds were observed to find out the relationships of between priming effects and morphological and physiological activity changes

Materials and Methods

1. Cultivar used : *Oryza sativa* L. cv. 'Ilpumbyeo'
2. Priming : Soaked in a -0.6 MPa PEG 8000 solution with air-bubbling
   1) Non-primed, 2) 15℃ 4 days, 3) 25℃ 4 days, 4) 25℃ 10 days
3. Observations
   1) Structural changes in dry and germinating primed seeds at 20℃ (SEM)
   2) Changes in sugars during the priming (HPLC)
   3) α-amylase activity during the priming (Iodine method)
   4) Germination rate and T_{50} (AOSA method)

Results and Discussion

1. The size of coleoptile and differentiated leaves of properly primed seeds was bigger and compound starch grains in the endosperm disintegrated into tiny starch granules as priming of seeds advanced
2. Sucrose, maltose, and raffinose contents decreased, while content of glucose and fructose and α-amylase activity increased after priming
3. Sugar content and α-amylase activity of over-primed seeds were lower compared with non-primed seeds or properly primed seeds.
4. The time to get 50% germination(T_{50})of properly primed seeds was faster than non-primed seeds

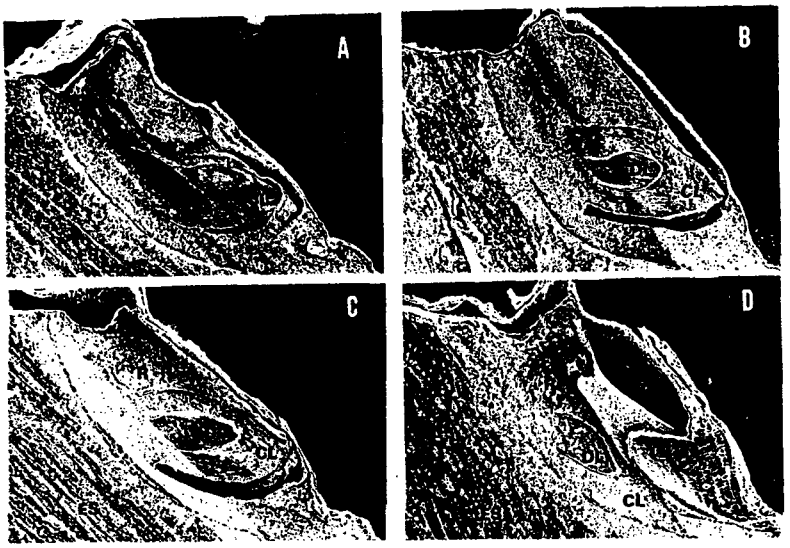

Photo. 1. Embryos of non-primed and primed rice seeds in -0.6 MPa PEG solution at 15℃ for 4 days and at 25℃ for 4 and 10 days (x 60 in a SEM). ES; endosperm, CL; coleoptile, R; radicle, DL; differentiated leaves. A: Non-primed, B: 15℃ 4 days, C: 25℃ 4 days, D: 25℃ 10 days

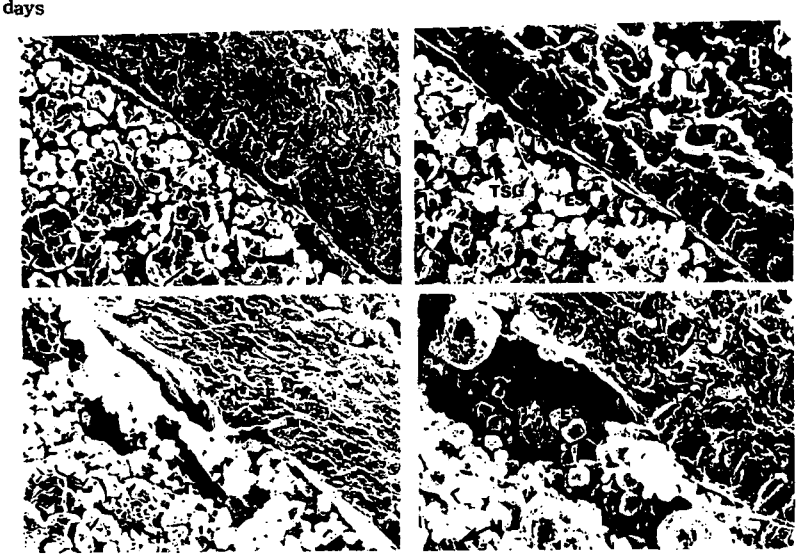

Photo. 2. Starch granules in embryo and endosperm of rice seeds primed in -0.6 MPa PEG solution at 15℃ for 4 days and at 25℃ for 4 and 10 days (x 1500 in a SEM). E; embryo, ES; endosperm, CSG; compound starch grain, TSG; tiny strach granule, H; hole in TSG. A: Non-primed, B: 15℃ 4 days, C: 25℃ 4 days, D: 25℃ 10 days

Table 1. Sugar content, α-amylase activity, germination rate, and time to 50% germination (T_{50}) of rice seeds primed at 15 and 25℃ for 4 days.

Priming	Sugar (mg/g seed)						α-amylase activity (Unit)	Germ. rate (%)	T_{50} (days)
	Fructose	Glucose	Sucrose	Maltose	Raffinose	Total			
No priming	0.4 b†	4.0 ab	1.5 a	1.9 a	0.6 a	8.5 b	2.1 b	94 ns	6.4 c
15℃ 4 days	1.1 a	6.2 a	0.6 b	1.6 ab	0.5 b	10.0 a	2.8 a	97	5.7 a
25℃ 4 days	0 c	2.1 b	0.5 b	0.8 b	0 c	3.4 c	2.0 b	95	6.1 b

† Means within a column followed by the same letter are not different by the Duncan's New Multiple Range Test at the 5% level