

Seed Coat Permeability in Selected Crops

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Objectives

Comparison of seed coat permeability (SPL) for different crops

Treatments

Crop six

Field corn punctured by drill

Rice cv. Labelle Texas punctured by drill

Soybean punctured by drill

Wheat punctured by needle

Cabbage punctured by needle

Pepper puncture by needle

Each 50 seeds two puncture treatment

Intact seed coat

Puncture close to embryo puncturing through seed coat

The drill hole was made with the Dremel tool

Methodology

TZ solution staining treatment

Intact and punctured seed were soaked at 25 °C

TZ solution concentration and staining time were different for
different crops

Evaluation of seed coat permeability by color staining density

Observe staining is embryos of all crop seeds

Characterize staining as none, weak or strong

Calculated 1) Sum = (weak x 2) + (strong x 4)

2) Value of permeability = Sum x 48/hours

3) Percent permeability = Sum (Intact) x 100/Sum (Punctured)

Summary and Conclusions

The percent permeability of soybean, wheat, brown rice, cabbage, field corn rough rice, and pepper seeds was 100, 96, 94, 91, 74, 33 and 6, respectively after imbibing at 25°C for 24 hours.

The seed coat of soybean, wheat, brown rice and cabbage were quite permeable whereas the seed coat of pepper was impermeable.

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Table 1. Differences on permeability between 6 selected crop seeds after imbibing at 25°C for 24 hours

Crop	Treatment	TZ soln(%) Stain temp(C)	Staining time (hrs)	Degree of stain density (50 seeds)					Value of permeability	Percent permeability		
				None	Weak	Strong	Sum	48/hrs				
Field Corn	Intact	0.5%, 25C	24	20	28	2	64	2	128	-		
			36	17	25	8	82	1.33	109	-		
			48	16	33	1	70	1	70	-		
	Puncture		24	13	31	6	86	2	172	74		
			36	5	30	15	120	1.33	160	68		
			48	6	22	22	132	1	132	53		
Rice, Rough	Intact	0.5%, 25C	6	48	2	0	4	8	32	-		
			12	39	7	4	30	4	120	-		
			24	32	10	8	52	2	104	-		
	Puncture		6	23	20	7	68	8	544	6		
			12	14	11	25	122	4	488	25		
			24	5	10	35	160	2	320	33		
Rice, Brown	Intact	0.5%, 25C	6	15	23	12	94	8	752	-		
			12	17	11	22	110	4	440	-		
			24	0	13	37	174	2	348	-		
	Puncture		6	12	15	23	122	8	976	77		
			12	4	18	28	148	4	592	74		
			24	1	5	44	186	2	372	94		
Wheat	Intact	0.5%, 25C	12	12	18	20	116	4	464	-		
			24	3	14	33	160	2	320	-		
			36	4	6	40	172	1.33	229	-		
	Puncture		12	7	15	28	142	4	568	82		
			24	4	9	37	166	2	332	96		
			36	0	2	48	196	1.33	261	88		
Pepper	Intact	0.5%, 25C	24	48	1	1	6	2	12	-		
			36	47	3	0	6	1.33	8	-		
			48	49	1	0	2	1	2	-		
	Puncture		24	2	45	3	102	2	204	6		
			36	0	25	25	150	1.33	200	4		
			48	0	16	34	168	1	168	1		
Soybean	Intact	0.1%, 25C	3	9	27	14	110	16	1760	-		
			6	2	30	18	132	8	1056	-		
			9	0	28	22	144	5.33	768	-		
			12	0	5	45	190	4	760	-		
			24	0	0	50	2	400	800	-		
			Puncture	3	0	3	47	194	16	3104	57	
	6			0	2	48	196	8	1568	67		
	9			0	1	49	198	5.33	1055	73		
	12			0	1	49	198	4	792	96		
	24			0	0	50	200	2	400	100		
	Cabbage			Intact	0.1%, 25C	6	47	1	2	10	8	80
			9			48	2	0	4	5.33	21	-
12		40	10			0	20	4	80	-		
24		2	9			39	174	2	348	-		
Puncture		6	2			48	0	96	8	768	10	
		9	0			45	5	110	5.33	586	4	
		12	2	44		4	104	4	416	19		
		24	0	4		46	192	2	384	91		