

Deficiencies in both starch synthase (SS) IIIa and branching enzyme IIb lead to a significant increase in amylose in SSIIa inactive japonica rice seeds.

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## SUPPLEMENTARY DATA

**Supplementary Table 1.** The composition of carbohydrate content (weight %) in the endosperm starch fractions separated by gel filtration chromatography (Toyopearl HW55S/HW50S x 3).

Lines		Frac. I <sup>a</sup> (%)	Frac. II (%)	Frac. III (%)	TAC <sup>e</sup> (%)	III/II
WT (Nipponbare)	starch <sup>b</sup>	21.2±0.3 <sup>d,h</sup>	20.3±0.1 <sup>h</sup>	58.5±0.3 <sup>h</sup>	18.2 <sup>h</sup>	2.9±0.0 <sup>h</sup>
	amylopectin <sup>c</sup>	3.0±0.4	17.7±0.9 <sup>h</sup>	54.4±1.8 <sup>h</sup>	-	3.1±0.1 <sup>h</sup>
WT (Kinmaze)	starch	21.6±2.0 <sup>h</sup>	21.0±0.7 <sup>h</sup>	57.4±2.0 <sup>h</sup>	19.3 <sup>h</sup>	2.8±0.2 <sup>h</sup>
	amylopectin	2.3±0.3	21.3±0.7 <sup>h</sup>	59.7±2.3 <sup>h</sup>	-	2.8±0.2 <sup>h</sup>
<i>ss3a</i> ( <i>e1</i> )	starch	30.7±1.0 <sup>f,g</sup>	13.9±0.9 <sup>f,g</sup>	55.4±0.9 <sup>f,g</sup>	27.6 <sup>f,g</sup>	4.0±0.3 <sup>f,g</sup>
	amylopectin	3.1±0.3	12.1±0.5 <sup>f,g</sup>	53.1±1.3 <sup>g</sup>	-	4.4±0.1 <sup>f,g</sup>
<i>be2b</i> ( <i>EM10</i> )	starch	28.1±0.1 <sup>g</sup>	39.7±0.2 <sup>f,g</sup>	32.2±0.3 <sup>f,g</sup>	26.8 <sup>g</sup>	0.8±0.0 <sup>f,g</sup>
	amylopectin	1.3±0.0 <sup>f,g</sup>	38.3±0.4 <sup>f,g</sup>	32.3±0.4 <sup>f,g</sup>	-	0.8±0.0 <sup>f</sup>
<i>ss3a/be2b</i> (#4019)	starch	45.1±1.5	27.5±0.3	27.4±1.1	42.6	1.0±0.0
	amylopectin	2.5±0.1	27.2±0.4	24.4±0.3	-	0.9±0.0

<sup>a</sup>Three fractions (Fr. I, II and III) was divided at the valleys of the carbohydrate content curve equipped with refractive index detectors (Figure 5).

<sup>b</sup>Total carbohydrate content was 100 %.

<sup>c</sup>The area for Fr. II and Fr. III of amylopectin were superimposed on those of the starch, and the amount of the Fr. I of amylopectin (extra long chain) was calculated.

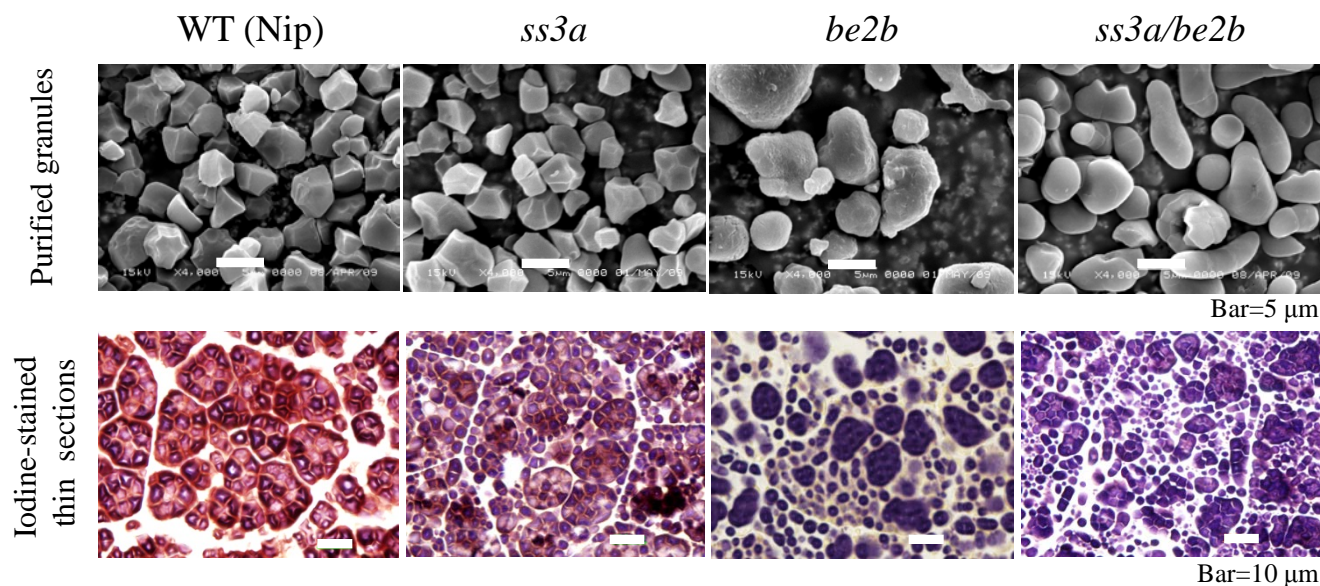
<sup>d</sup>Mean±SE of at least two replications.

<sup>e</sup>True amylose content=apparent amylose content (Fr. I of starch) – extra long chains (Fr. I of amylopectin).

<sup>f</sup>Significant differences between parental mutant lines and the WT by t-test at P<0.05.

<sup>g</sup>Significant differences between the parental mutant lines and the *ss3a/be2b* mutant by t-test at P<0.05.

<sup>h</sup>Significant differences between the *ss3a/be2b* mutant line and the WT by t-test at P<0.05.



**Supplementary Figure 1.** Observations of starch granules and endosperm cells. Scanning electron micrographs of purified starch granules (upper panels). Bars=5  $\mu$ m. Thin-section of mature endosperm stained with iodine observed by light microscopy (lower panels). Bars=10  $\mu$ m.