

DEVELOPMENT OF HYBRID RICE VARIETY PR40638H WITH BACTERIAL LEAF BLIGHT RESISTANCE

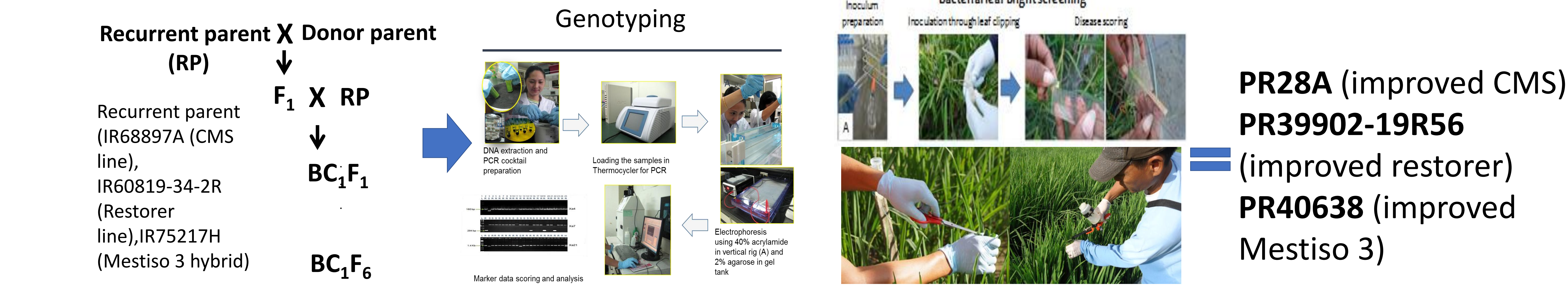
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Bacterial leaf blight (BLB) disease is one of the serious diseases which could cause up to 20-30 % and could reach as high as 80 % if susceptible plants are used. Development of resistant rice cultivars is an effective approach to combat bacterial blight. This study aimed to develop rice parent lines (PR28A and PR39902-19R56) and hybrid (PR40638) with introgressed *Xa21* gene for BLB resistance and to evaluate these breeding lines based on phenotype and genotype data. .

MATERIALS & METHODS



RESULTS & CONCLUSION

Table 1. Reaction of original parent lines (IR68897A, IR60819-43-2R, IR75217H), improved lines (PR28A, 19R56 and PR40638H), susceptible check (IR24, IRBB4), resistant check (IRBB21, IRBB52) to 14 isolates

TREATMENTS	Xa genes present	ISOLATES													
		PX061	PX086	PX079	PX0340	PX071	PX0112	PX099	PX0145	PX0280	PX0339	PX0349	PX0347	PX0363	PX0341
IR24	None	S	S	S	S	S	S	S	S	S	S	S	S	S	S
IRBB4	<i>Xa4</i>	R	S	MS	S	MR	MR	MS	R	R	MS	MS	S	MS	R
IRBB21	<i>Xa21</i>	R	R	R	R	R	R	R	R	R	R	R	R	R	S
IRBB52	<i>Xa4+Xa21</i>	R	MR	R	R	R	R	R	R	R	R	MR	R	R	R
IR68897A	<i>Xa4</i>	R	S	MS	MS	MR	MR	S	MR	MR	R	R	S	S	R
IR60819-43-2R	<i>Xa4</i>	R	S	MS	MS	MR	MR	S	R	MR	R	R	S	S	R
IR75217H	<i>Xa4</i>	R	S	S	S	MR	MR	S	MR	R	R	MR	S	S	MR
PR28A	<i>Xa4+Xa21</i>	R	MR	R	R	R	R	R	R	R	R	R	R	R	R
19R56	<i>Xa4+Xa21</i>	R	R	R	R	R	R	MR	R	R	R	R	R	MR	R
PR0638H	<i>Xa4+Xa21</i>	R	R	R	R	R	R	R	R	R	R	R	R	R	R

Legend: R = Resistant (<5 cm), MR = Moderately Resistant (5.1 cm – 10 cm), MS = Moderately Susceptible (10.1 cm – 15 cm), S = Susceptible (>15.1 cm)

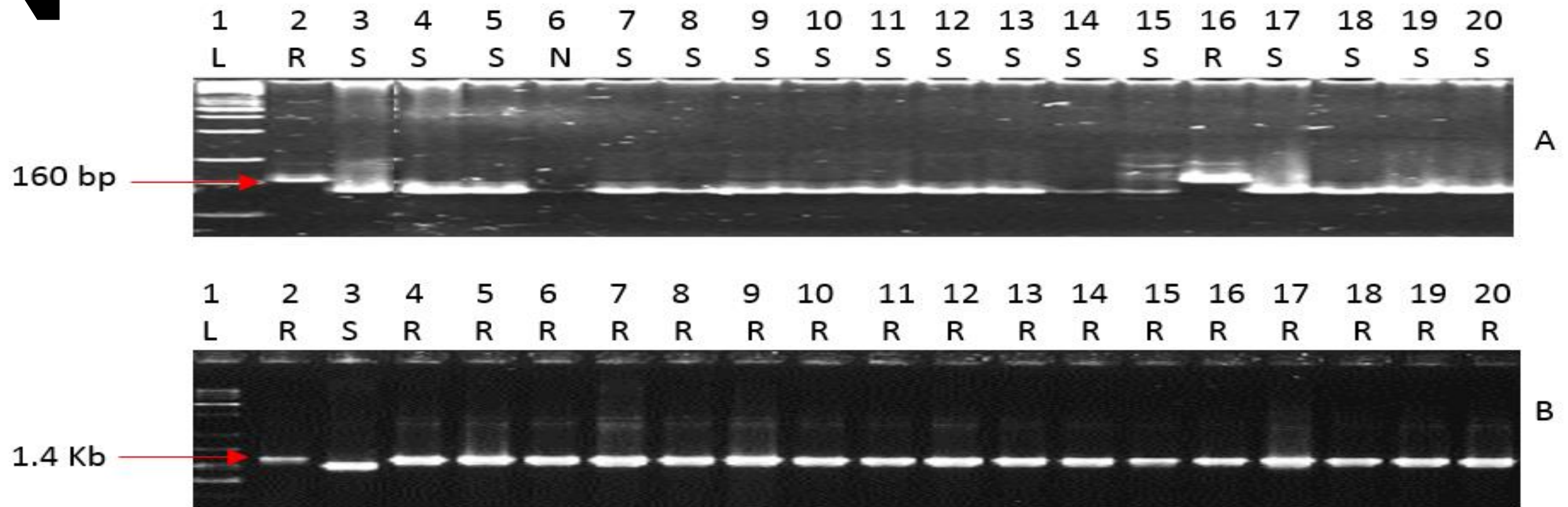


Figure 1. PCR products of resistant check IRBB52 (Lane 2), susceptible check IR24 (Lane 3), and tested entries (Lanes 4-20) using STS primers MP for (A) *Xa4* and (B) U1/I1 for *Xa21*. R - resistant allele; S - susceptible allele; N – no amplification). Size marker = 1 kb (Lane 1).

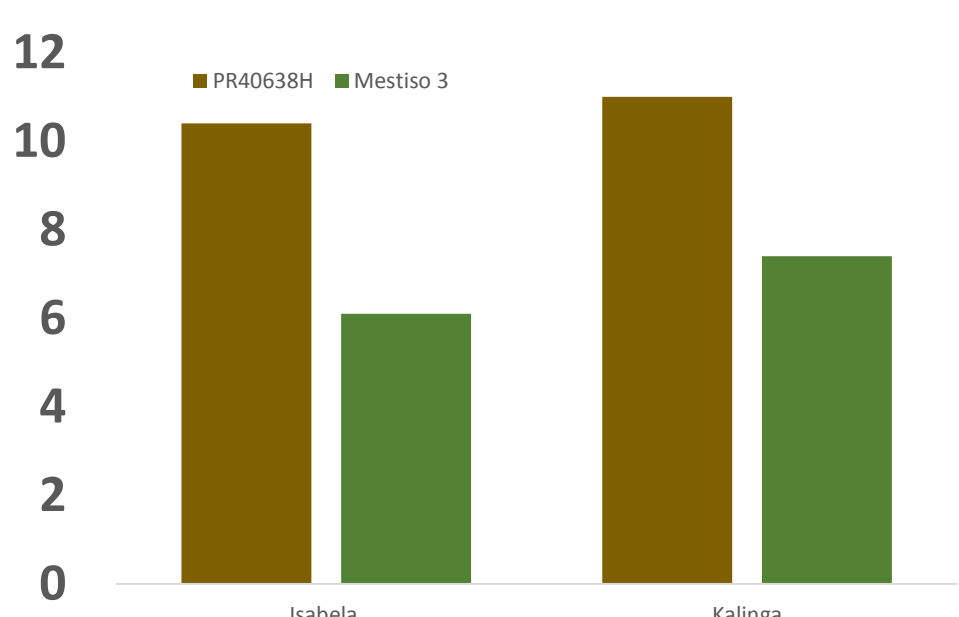


Figure 3. Field grain yield (t ha⁻¹) estimates of PR40638H vs Mestiso 3

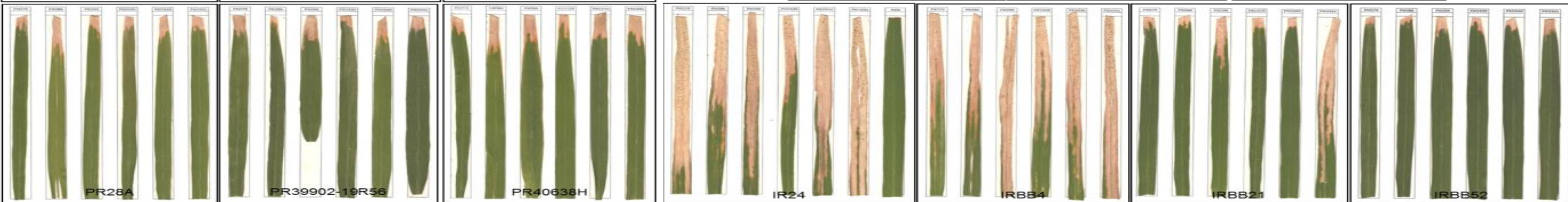


Figure 2. Lesion length of improved lines (PR28A, PR39902-19R56, PR40638H), susceptible checks (IR24, IRBB54) and resistant checks (IRBB21, IRBB52)



Figure 4. Crop stand of PR40638H evaluated in multi-yield trial at Philippine Rice Research Institute Central Experiment Station,, Muñoz, Nueva Ecija, Philippines

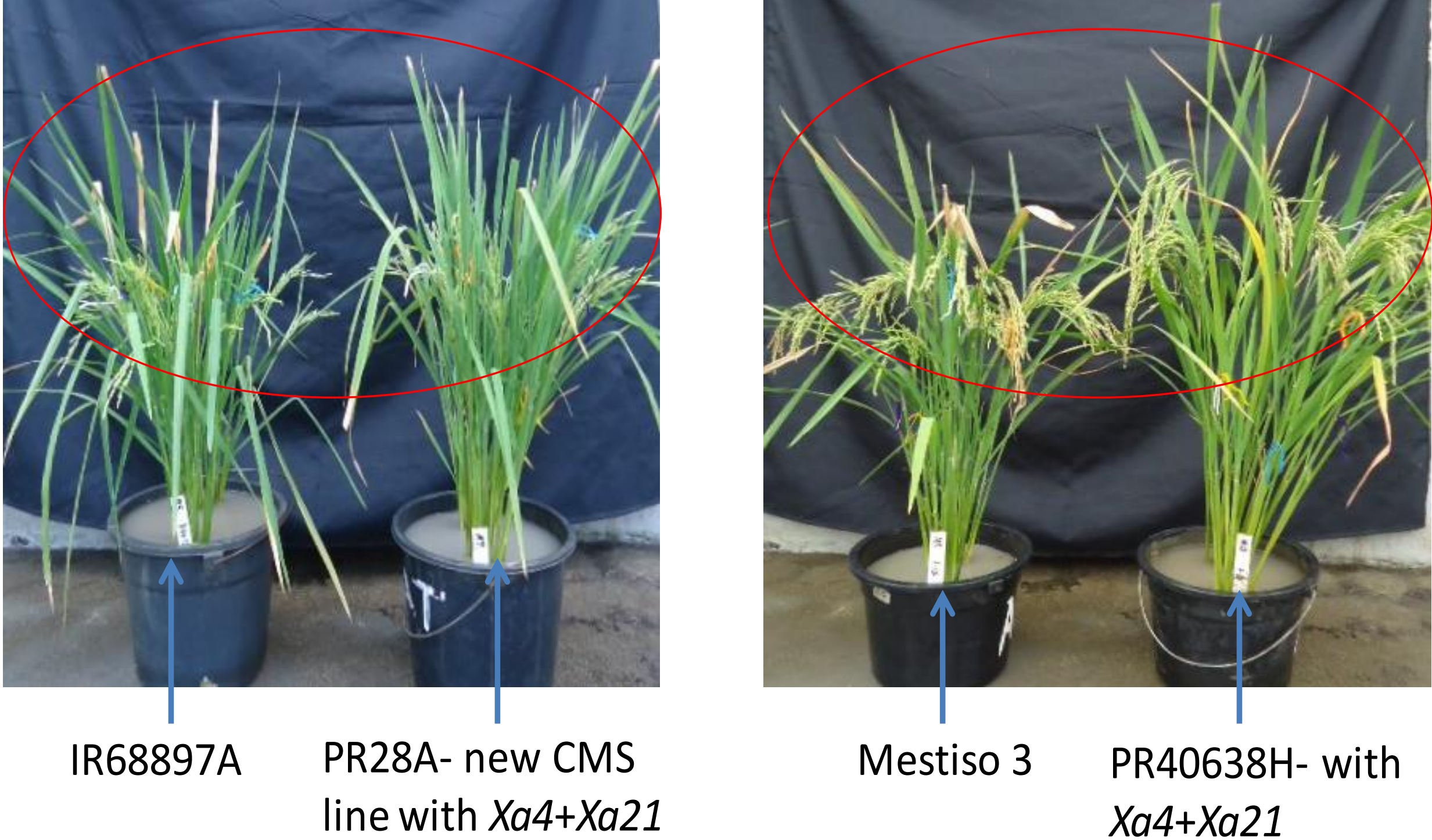


Figure 5. Differential reaction showing improved lines (right) with increase resistance to BLB as compared to the original lines (left) to races of Xoo at 14 days after inoculation.

Statistical analysis confirmed that the improved parent PR28A (improved CMS lines), PR39902-19R56 (improved restorer lines) and PR40638H (improved hybrid) have increased resistance to all the isolates tested which is comparable to that of the positive check IRBB52 (resistant check) containing the same resistance genes *Xa4+Xa21*, suggesting successful introgression of the resistance gene *Xa21*. Both PR28A and PR40638H exhibited short lesions when inoculated with most prevalent Xoo races in the Philippines. The presence of *Xa4+Xa21* genes for BLB tolerance was confirmed using molecular markers thereby ensuring and fast-tracking the development of improved Mestiso 3 hybrid and parent lines with increased and broader resistance spectrum compared to lines with only one gene. In terms of yield, PR40638 hybrid has higher yield as compared to the original Mestiso 3 hybrid during the evaluation in the multi-location trials in the Philippines.

PR40638 (improved Mestiso 3) hybrid with *Xa4+Xa21* genes for bacterial blight resistance was successfully developed through marker-assisted backcrossing. This hybrid with superior yield and BLB resistance could be used to increase rice production to contribute to attaining staple food sufficiency in the Philippines.