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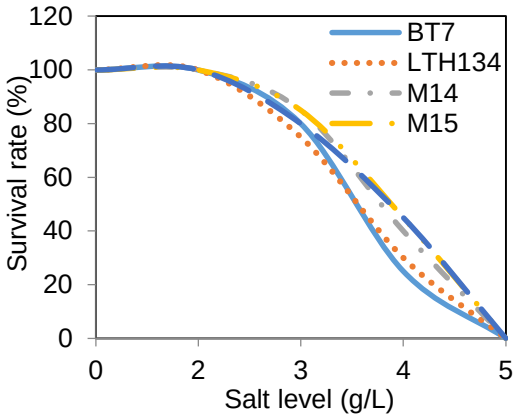
Alternative rice cropping systems tolerant to salinity under climate change in Vietnam

Salinity caused by sea level rise is expected to adversely affect the sustainable development of local communities' in the coastal areas of Vietnam by making productive lands unfit for rice cultivation. Rice is usually considered moderately sensitive to salinity. Rice farmers in Vietnam are looking for cropping systems that are more tolerant to salinity while maintain yield under the changing climate. This technical brief presents preliminary results from experiments conducted on five rice cultivars (BT7 as control) response to various levels of salts in irrigation water in Thinh Long commune and Rang Dong farm in northern Vietnam as part of ClimaViet project.

Key points

- **Increase in salinity** decreases rice yields and yield components progressively.
- **Rice varieties** can grow well up to 2.5 g of salt per litre water
- **Farmers' need access** to good quality seeds that are tolerant to salinity at affordable price
- **Seed multiplication** centers must be supported



The survival rate of all rice varieties is 100% when the salt level is between 0 to 2 g/L. Above 2 g/L salts, the survival rate decreases sharply in all rice varieties. TX111 survival rate was twice higher than BT7 at 4 g/L salt concentrations.

TX111 gives highest grain yield at 0 to 4 g/L salt levels. No rice yields were harvested at 5 g/L salt levels. The TX111 variety is more tolerant to salinity than other rice varieties. As salinity increases, grain yield and yield components of rice

Rice affected by salinity

TX111 has a longer duration, high tolerance to salinity, gives high yields. However, the costs of seed is high. **M15** is high yielding and tolerant to salinity, good taste, low amylose content, high purity rate and high number of filled/ panicle, but, sensitive to blight disease. **M14** has longer duration, gives low yield and sensitive to salinity **BT7** has good taste, light aroma but susceptible to salinity and blast disease. **LTH134** is a short growing variety, good taste and tolerant to blight disease, but gives lower yield

	Rice grain yield (g/plant) at salt concentrations				
	0 g/L	2 g/L	3 g/L	4 g/L	5 g/L
TX111	275	236	210	175	0
M15	232	217	171	167	0
BT7 (control)	228	209	151	140	0
M14	206	190	162	134	0
LTh134	194	174	149	123	0

Yield components of rice

The number of tillers per plant, plant height (cm), number of panicles/m^2, number of filled grains per panicle, 1000 seeds weight (g) were greater in TX111 than other rice varieties treated in Rang Dong and Thinh Long study sites during spring and summer 2014.

Farmers' adaptation

- Almost 90%) of the households interviewed (n = 40) responded to use salt-tolerant crop varieties to adapt to the changing climate conditions.
- A small percentage of farmers (<16%) prefer to use traditional rice varieties, because they assume that the rice varieties are more suitable to climatic conditions in autumn cropping season and cultivation practices.

Farmers' needs related to Policy / Institutions

- Support to supply salinity tolerant seeds with affordable price;
- Investment on seed production;
- Irrigation infrastructure improvements;
- Crop insurance;
- Coordination of water scheduling at the commune level;
- Public-private partnerships; and
- Integrating local and science-based knowledge

- Farmers' capacity to produce pure seed should be strengthened in the new adaptation initiatives in Nam Dinh province to address salinity. For this, they need good quality seed supply on time and at affordable price.

- In general, the order of tolerance to salinity is **TX111** > **BT7** > **M15** > **M14** > **Lth134**

- TX111 showed best performance over the other rice varieties. Growing rice varieties like TX111 could be part of an adaptation strategy for salinity intrusion of seawater in the coastal Mekong delta

Literatures

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Remarks