

seeding technique such as broadcasting, row seeding and drill seeding are recommended. In the areas where flood is expected to occur in August to September, transplanting is recommended with 4-6 seedlings per hill.

Management after flooding

Proper nursery management enhances survival and grain yield of TDK1-Sub1 after submergence in the field. Drain water out from the field as soon as possible after water subsides in order to promote tillering ability.



TDK1-Sub1 20 days after flooding



TDK1-Sub1 40 days after flooding



TDK1-Sub1 in flowering stage



TDK1-Sub1 in maturity stage

Fertilizer application

In the flood plain, where soil is fertile do not apply chemical fertilizer, be-

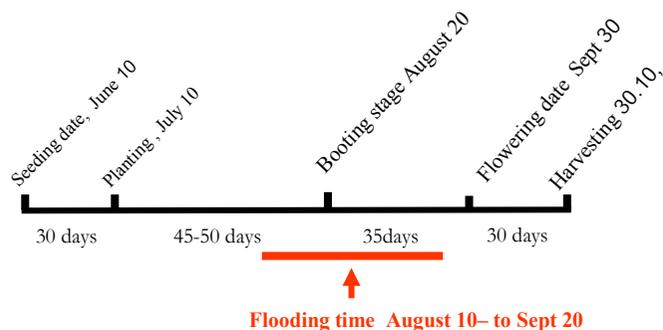
cause it will degrade the tolerance of the rice plant to flooding. However, in normal condition, application of compound fertilizer 15-15-15 is recommended in sandy soil at the rate of 200 kg/ha, while in clay soil, 16-20-00 is recommended at the rate of 150 kg/ha, 7-10 days after transplanting. Urea 46% application is recommended 20 and 35 days after transplanting at the rate of 60 kg/ha per time.

Application of farmyard manure is recommended at the rate of 10 t/ha.

Harvesting

To achieve percentage of milled rice recovery higher than 60%, harvesting is recommended to be done 30 days after rice plant flower 50%.

Calendar for planting TDK1-Sub1



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Ministry of Agriculture and Forestry
National Agriculture and Forestry Research Institute
Rice & Cash Crop Research Center

Guidelines for Thadokham 1 Sub-1 (TDK1-Sub1) rice seed production



5 days after flooding



20 days after flooding



In flowering stage



In maturity stage



Nam Theun 2
Power Company Ltd.
Downstream Program
May 2013

Introduction

Flood or submergence is a problem in poorly drained areas that receive excess water because of heavy rainfall or overflow from rivers.

Flood is the main constraint affecting rice production in Laos and causes production losses up to 100%, particularly in areas located along the rivers. In addition, flood causes high variability and vulnerability of the rice production in flood plain. In wet season 2011, flood destroyed about 34,200 hectares of rice fields located in five districts along the Xe Bangfai river: Gnommalat, Mahaxai, Xe Bangfai, Nongbok & Xaibouli.

What are the types of flood

Three types of flood are observed.

1. "Flash flood" or submergence can occur any time during the growing season. Its duration is variable, usually 1-2 weeks.
2. Stagnant partial flooding is long term flooding, normally for most of the season. It seriously reduces the yield of modern and traditional varieties by reducing tillering, panicle size and fertility and causing mortality. It usually occurs in the fields located in low toposequence.
3. Deep water flooding occurs when water depth is greater than the normal plant height and over a longer

duration (months). Plant need to elongate to keep pace with the rising water. Floating rice variety is recommended for use in this environment.

What is the TDK1-Sub1 variety

TDK1-Sub1 contains the submergence-1 (SUB1) gene that allows this variety to survive more than 17 days of complete submergence and renew growth when water subsides. However, the duration of survival is also influenced by environmental factors such as water turbidity, temperature, light and other factors such as seedling age at time of submergence. Plants become more tolerant as they get older.

Background of TDK1-Sub1

Developed at the International Rice Research Institute (IRRI) in 2003 by back-crossing method to transfer Sub1 gene from IR40931-33-1-3-2 into TDK1 (glutinous Lao variety). Introduced to Laos in 2008. In wet season 2009 and 2010, NTPC Downstream Program, with the technical support of Rice & Cash Crop Research Center (RCCRC) organized trials and demonstrations of submergence tolerant rice variety "Thadokham 1 Sub1" (TDK1-Sub1). Trials were conducted in Xe Bangfai flood prone areas of five districts of Gnommalat, Mahaxai, Xe Bangfai and Nongbok, Khammouane Province and Xaibouli, Savannakhet Province. In dry season 2011, following encouraging results of past wet seasons trials, seeds of TDK1-Sub1 were pro-

duced on a larger scale and 40.5 tons were disseminated by NTPC-DSP to 1,800 households in 86 villages of the 5 districts for planting in flood prone areas in wet season 2011. In 2012 about 70 tons were distributed to more than 5,000 households in Xe Bangfai basin villages.

Grain yield

Dry season: 3-5.5 t/ha

Wet season:

- In normal condition 3-4 t/ha.
- In submergence condition for 17 days, give grain yield from 1.5 to 4 t/ha depending on flooding conditions.

Maturity date

From seeding to 50% flowering date: 110-115 days; however, duration will vary depending on duration of the flooding.

Seeding rate

For robust seedlings, recommendation to use 0.5-1 kg/10 m². Apply urea at the rate of 1 kg/100 m², 7-10 days after seeding.

Planting technique

In dry season: Transplanting can be done when seedlings are aged 25-30 days. Planting 2-4 seedlings per hill with spacing of 20 x 20 cm or 20 x 15 cm.

In wet season: In the areas where flooding usually occurs in July, direct