Permit Title : Confined Field Trials of **N**itrogen Use **E**fficient, **W**ater Use **E**fficient (drought tolerant) and **S**alt **T**olerant transgenic (**NEWEST**) rice plants

Tracking Number : **2012-204-CRIK-001-C**

Name of applicant : Crops Research Institute of the Council for Scientific and Industrial Research.

Permit start Date : November 16, 2012

Permit Duration : Three (3) years

Extension : The research has been extended on three times consecutively. It is currently at its final stage.

The **aim** of project is to develop genetically improved African rice varieties with enhanced nitrogen-use efficiency, drought and salt tolerance. This project is expected to contribute to increased productivity of rice within smallholder farming systems thereby achieving food security and improving rural livelihoods. This will be achieved through improvement of Rice via development and utilization of **N**itrogen Use **E**fficient, **W**ater Use **E**fficient (drought tolerant) and **S**alt **T**olerant transgenic (**NEWEST**) rice plants.

The **specific activities** will be to: 1). First evaluate the agronomic performance of transgenic Nerica expressing the NUE genes and later evaluate performance of the transgenic rice expressing the NUE, WUE, ST (NEWEST) triple stacked genes against non-transgenic Nerica check; 2. make crosses to incorporate NUE and NEWEST genes into popular varieties in Ghana 3. collect data relevant for environmental and food safety assessment for submission to regulatory authorities as part of an application for commercial deployment of genetically improved rice. The experimental design used for NUE will be a split plot of two factors – rice varieties and fertilizer rate whilst that for NEWEST will be a split-split plot of three factors – rice varieties, fertilizer rate and moisture level.

This application therefore requests for permit to establish a confined field trial to evaluate the efficacy of modified NERICA upland rice varieties under nitrogen-deficient soil environments and later to test for nitrogen-use efficiency, drought and salt tolerance. Being a confined field trial, all measures will be taken to ensure material and genetic confinement of the test plants to the trial site only. The proposed trial will be carried out on a two-acre plot at a site well isolated from rice growing fields. Trials will be repeated until 2018 to generate efficacy and safety data that will eventually be used when requesting a general release permit.

The trial will be sited at least 50 meters away from any other area cropped to rice. This isolation distance exceeds allowable distance within which outcrossing in rice may occur. Rice is 99% self-pollinated, has short pollen duration, with longest period 15 minutes as well as moderately short

stigma reception period of less than three days. This physiological adaptation to selfing results in out-crossing within Oryza species in field of between 0% and 5% (OECD, 1999) but most reviews have settled on outcrossing of between 0% and 1% (Gealy et al, 2003 ; Heuer and Meizan, 2003).

At crop maturity, rice will be hand-harvested into clearly labeled cloth/paper bags and be transported securely to nearby CRI laboratories for threshing and data recording. The seeds will then be clearly labeled and stored in a specially secured seed storage locker within the laboratory and under the sole custody of the PI. The quantity of seed in storage will be disclosed to the NBA upon request and will never be used for any other purpose without consent and approval of the IBC and NBA.

The proposed CFT site will be secured with a fence with a lockable gate in order to prevent incursion by unauthorized personnel and/or livestock. Appropriate signage will be placed onto the fence indicating that entry by unauthorized personnel is prohibited. During the trial, the site will have a 24-hour round the clock security patrol by guards for the sole purpose of enforcing security at the trial site. The security staff will have undergone a training programme on CFT Site Management alongside other project staff. Upon completion of the trial, a season-long monitoring and removal program of volunteer rice plants will be carried out. Such plants if found will be uprooted, collected in a secured bag and incinerated.

A Rice CFT Handbook will be maintained as a standard reference manual during the trial to minimize chances for accidental release of genetically modified plant material. In the very unlikely event of such occurrence, the trial staff will be duty-bound to report any such loss to the Site Trial Manager who will in turn report the same to the Principal Investigator. This will also be brought to the attention of the NBA in Accra. The circumstances surrounding such an eventuality will be investigated immediately and a recovery plan for the genetically modified plant material instituted.