



# **PRODUCTION OF *Basella* PLANTS RESISTANT TO RUST BY IRRADIATION OF SEEDS AND VEGETATIVE TISSUE**

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## **1. INTRODUCTION**

*Basella* is classified in the family Chenopodiaceae or Basellaceae. Also known as African spinach, this plant is consumed in Central Africa and several other African countries. There are two types of varieties grown in Congo:

- i. a local variety characterized by red leaves and stalks in which the principal way of propagation is from cuttings;
- ii. a group of varieties which have green or purple leaves and stalks. These varieties are called *Basella alba* and *Basella rubra*. These varieties have sexual reproduction.

Among the two groups of varieties, the local variety is propagated vegetatively but is resistant to rust, while varieties with green leaves or with purple leaves (*B. alba* and *B. rubra*) that are propagated from seed are susceptible to rust. Since hybrid cannot be made by conventional crossing, the following procedures have been adopted to produce plants with disease tolerance: 1. production of resistant variants by irradiation of *Basella alba* seeds with Cesium 137; 2. production of resistant variants by irradiation of vegetative tissues obtained by culture of meristematic cells of *B. alba*; and 3. obtaining resistant plants through somaclonal variation.

## **2. MATERIALS AND METHODS**

*Basella alba* seeds were irradiated with various doses of gamma rays from a Cs<sup>137</sup> source and seed germination was recorded.

## **3. RESULTS AND DISCUSSION**

### **3.1. *Effects of irradiation dose on seed germination***

Seed germination ranged between 61 and 62% (Table I). Seeds irradiated with 50 to 150 Gy had germination between 60 and 57%. Seeds irradiated with 200 to 300 Gy had germination between 40 and 46% and those irradiated with 400 to 500 Gy between 29 and 23%.

**TABLE I. EFFECT OF RADIATION DOSE ON SEED GERMINATION, SEEDLING SURVIVAL AND HEIGHT**

Radiation dose Gy	No. of seeds irradiated	Seed germinated		Seedling survival after 24 days		Mean seedling height cm	Inhibition of growth %
		No.	%	No.	%		
T1	246	152	62	152	100	46	0
T2	246	150	61	150	100	45	0
50	246	148	60	148	100	45	0
100	246	134	54	134	100	30	34
150	246	132	54	132	100	24	48
200	246	113	46	54	48	11	77
250	246	115	41	60	52	8	83
300	246	93	42	36	39	2	95
400	246	71	29	39	53	5	89
500	246	56	23	19	33	3	94

### 3.2. *Effects of radiation dose on plant mortality*

There was no mortality among plants obtained from seeds irradiated with 50 to 150 Gy. Seedling mortality ranged from 33 to 53% among plants obtained from seeds irradiated with 200 to 500 Gy.

### 3.3. *Effect of radiation dose on plant growth*

Inhibition of plant growth was very high in plants obtained from seeds irradiated with 100 and 500 Gy.

### 3.4. *Irradiation of tissue cultures*

A suitable culture medium was developed to obtain *in vitro* plants from meristematic cells of *B. alba* (rust sensitive variety). The *in vitro* plants will be irradiated to test their radio-sensitivity.

The preliminary results showed that doses between 150 to 200 Gy reduced 50% germination of seed, seedling survival and growth. These two doses will be used in the next cycle.