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Utilization and Feasibility of Retting Effluent as Fertilizer in Vegetable Crops Production

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Abstract: Jute retting was conducted in the corner of rice filed by making artificial ditches. Retting could be efficiently conducted in the rice field. The fibres produced there of were also of good quality and as the ribbons were retted, the percentage of cutting in the basal parts were also very nominal. The fertilizer value of the retting effluent was tested on three vegetable crops of cabbage, brinzzal and tomato. In all the cases, retting effluent showed better yield than the control. The tithe of the soil was also increased.

Key words: Retting, effluent, feasibility, vegetable crops, fertilizer

Introduction

Deficiencies of the nutritional elements can produce serious losses in yield as well as crop quality and these deficiencies arise either from a natural shortage of these nutrients or as a result of reactions of the organic matter with the micronutrients to produce an unavailable complex (Devi *et al*., 1999; Alam, 1984; Alam *et al*., 1999). For the increase of production of grains, soil fertility is the most important factor and this fertility mainly depends upon three major nutrients namely nitrogen, phosphorus and potassium (Akhter *et al.,* 2002, 2001). During the retting of jute and allied fibrous plant, huge amount of non-fibrous matter are decomposed and removed. As a result, retting effluent contain decomposed matters that are very rich in nitrogenous and organic matters Organic matter recycling is becoming an increasingly important aspect of environmentally sound sustainable agriculture. Organic matter holds a great promise due to their local availability, as a source of multiple nutrients and ability to improve soil characteristics (Bellakki and Badanur, 1994). It is prerequisite to improve the soil health of Bangladesh urgently for future better crop production. Presently it needs to apply organic materials in our soil from conventional sources or other external sources, otherwise agricultural production will be reduced due to poor soil properties (Gani *et al*., 2001). So non-conventional sources of organic materials may be used as alternate approaches to minimize the soil problems.

Thus effluent from jute retting can be utilized as fertilizer for the production of crops. Retting in rice field got into practice in China. It eliminated water pollution and retains retting wastes as manure, also expounding of water offered protection from nematodes (Ahmed *et al*., 2002, Chatiopadhyay *et al*., 1992, Shahjahan *et al*., 1986). Retting wastes as manure have strong message and resulted into its adaptation in other countries (IJO, 1994a). So an attempt has been made to ascertain the feasibility of jute retting effluent in rice field as a fertilizer. The objective of this study was to determine the effects of effluents on the production of three vegetable crops e.g. cabbage, brinzzal and tomato.

Materials and Methods

The on-station experiments were set up in the filed of the Central Jute Research Station of Bangladesh Jute Research Institute in randomized complete block design (RCBD) with three replications. Plot size was 5 x 4 m surrounded by raised leaves with 1 m spacing between plots and an artificial ditch in the side of filed by raising the two sides to keep it watertight. Water was supplied from irrigation source. Retting was conducted using the standard retting methods. After completion of retting, the retting effluents were spread to the rice field by breaking the interior side of the ditch. One-month-old seedlings of a susceptible variety of three vegetables e.g. Brinzzal (*Solanum melengena*), Tomato (*Lycopersicum esculentum*) and cabbage (*Brassica* sp.) were transplanted in these plots at 15 x 25 cm spacing. Plants in each plot were inoculated during plantlet stages with the methods followed by Shahjahan *et al*. (1986) and spraying was done with a knapsac sprayer at the rates according to Miah *et al*. (1994) three days before panicle initiation stage and/ or three days after inoculation (boot stage). Plants in the control plots were transplanted side-by-side without retting effluent but standard fertilizer dose was applied. In every cases of these vegetables, plant height, leaf length and leaf breadth were measured. Moreover, fruit population and yield were also recorded. On the other hand, soil pH and microbial population of the cultivated soil were determined using standard method.

Result and Discussion

Jute (*Corchorus capsularis* var. CVL-1) retting was efficiently conducted in the field and the fibers produced

Table 1: Retting of jute plant ribbons in rice field

Variety	Size of retting place (cm)	Weight of green ribbons (Kg)	Retting time (Day)	Fiber weight (Kg)	Fiber grade
C. capsularis var. CVL-1	15 X 15 X 2.5	60.00	15	14.00	A

Table 2: Utilization of retting effluent as fertilizer in cabbage (*Brassica* sp.) production

Plot No.	Number of plant	Average plant height (cm)	Average leaf number	Leaf height (cm)	Leaf breadth (cm)	Fruit weight (Kg)
Treatment	28	22.12	9.87	17.93	16.57	545.80
control	28	22.65	13.06	22.55	18.10	516.00

Table 3: Utilization of retting effluent as fertilizer in Tomato (*Lycopersicum esculentum*) production

Plot No.	No. of Plant	Average plant height (cm)	Average branch number	Average fruit number	Average fruit weight (Kg)
Treatment	27	40.51	10.37	17.89	411.00
control	27	41.07	20.59	19.17	358.77

Table 4: Utilization of retting effluent as fertilizer in brazzil (*Solanum melengena*) production

Plot No.	No. of plant	Average fruit weight (g)
P-1 Treatment	28	211.11
P-3 control	28	247.61

thereof were also fine quality producing "A" grade (Table 1) and the retting was completed within 15 days. In Table 2 it was observed that cabbage produced in the treatment plot was higher (545.80 kg) than the control plot (516 kg). Tomato was found (Table 3) higher production in treatment plot (411 kg) than the control plot (358.77 kg). On the other hand, in brazil production, it was observed from the Table 4 that treatment plot was lower (211.11 gm) in production than the control one (247.61 gm). Therefore it can be inferred that in all the cases crop production was significant and at the same time produced fiber quality from retting was good.

In retting, NO_3 is present in retting effluent and NO_3 is beneficial as fertilizer (Alam, 1984; IJO, 1994a; Shahjahan *et al.*, 1986). Since the defoliation of jute plants is done in the jute fields, after decomposition of leaves it adds some nutrients to the soil replacing chemical fertilizer use. In such fields, we can reduce the pollution by applying low amount of chemical fertilizer or no application of chemical fertilizers for the subsequent crops. In China, retting in rice field was developed for their location specific situation-rice and kenaf harvested about the same time, rice preceding the kenaf and 10-15 days gap between the first and the second crop of rice (IJO, 1994b; Chatiopadhyay *et al.*, 1992). In areas there are no rice fields jute/kenaf fields are also used, only clay soil fields are suited. It is a convenient method of retting with several advantages of labor saving, minimizing transport, retting effluents remain in the field serving as manure without creating any environment sensitivity impounding of water also reduces nematodes. Besides many advantages from retting angle it minimized the water pollution to less than one third and where sufficiently deep waters (0.75-1.0 cm) are available in fields or can be created, retting-in-field is a good proposition. It is also appealing to the farmers and periodic purging of field water is found desirable (IJO, 1994b; Ahmed *et al.*, 2002). Thus this practice has great potential of wider adaptation and future improvement.

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