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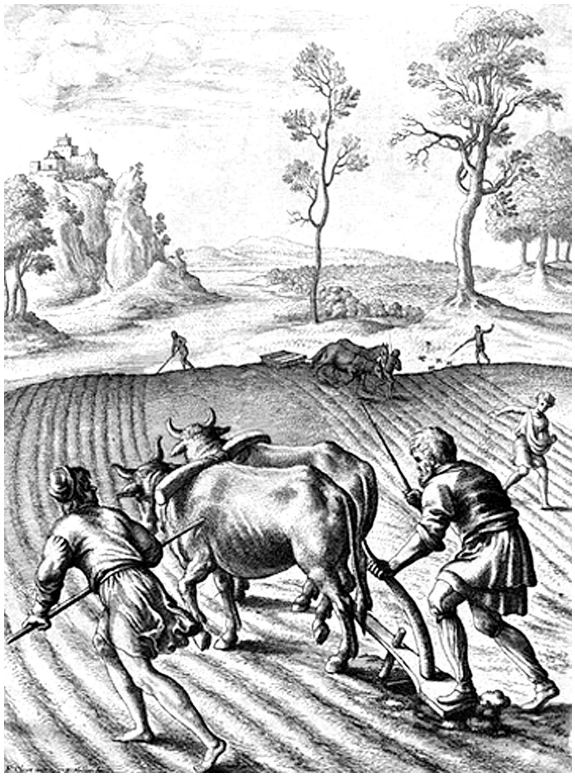

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Study on Seed Quality Status and Fibre Yield of Different Seed Categories of Jute (*Corchorus* spp.)

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Abstract: Purity, viability, vigour, green yield and fibre yield of O-9897 (*Corchorus olitorius L.*) and CVL-1 (*Corchorus capsularis L.*) were studied. Different seed categories were breeder seed, foundation seed, certified seed and farmers seed. Purity, viability and vigour of breeder seed were the best in all respects and of farmers seed were poor. However moisture content was the highest in farmers seed and lowest in breeder seed. The 1000 seeds weight was highest in farmers seed among the seed categories and in CVL-1 over the variety O-9897. Base diameter, green yield and fibre yield were influenced significantly due to seed categories studied. The highest fibre yield was obtained from the breeder seed (3.20 t ha^{-1} in 0-9897 and 2.64 t ha^{-1} in CVL −1). Declining trend of fibre yield were observed like- breeders seed > foundation seed > certified seed > farmer's seed as well.

Key wards: Jute seed, purity, viability, vigour, fibre yield

Introduction

Jute (*Corchorus* spp.) is a fibre yielding crop. Jute seeds are multiplied through different stages of multiplication. Agronomically, seeds are classified as (I) Breeders seed (ii) Foundation seed (iii) Registered seed and (iv) Certified seed. The quality of seeds played an important role to large extent on the agricultural Productivity. Poor germination and stand establishment causes low yield and sometimes crop failure. Most of the farmers of Bangladesh are not aware of the quality seeds. Usually seed quality is measured in terms of purity and viability. Seed purity tells the seedsman and consumer, how much unwanted material is present in the desired pure seed and specifies the nature of the each containment. The farmers are not bothering about seed vigour, an important factor for crop production. Vigour determines the speed and uniformity of germination, which are considered important for crop production. Seeds, perform well are termed as high vigour and those, which perform poorly are called low vigour seeds.

Khandakar (1980) discussed longevity of seeds broadly depending on two major factors which are the inherent genetic quality of the seed and the effect of environment on it. He again stated that storage temperature is an important factor, affecting the viability. Storage fungi are saprophytes and grow on storage products often at fairly low moisture content. Heydecker (1979) stated that poor storage conditions gave rise to deterioration of seed quality and resultant loss of viability, which greatly affected the seed vigour.

Barton (1954) showed that reduction in moisture content extends the life of Douglas Fir and Hemlock seeds. Christensen and Kaufman (1969) considered that the loss of seed viability was due to storage fungi and extent of deterioration was related to seed moisture content, storage temperature and the availability of oxygen. Sunsen and Wieve (1942) discussed that in a mixed situation conspicuous behavior was observed and presence of mixture in a seed lot of a good cultivar may be dangerous if cultivated year after year. Abdallah (1970) was shown that exudes from seed born fungi, both field and storage species, can either stimulate or reduce the amount of germination in Oats. Huda (1992) reported, significant superiority of certified seed over farmer's seed but in some instances quality of farmers seed was as good as certified. Several workers worked with jute seed purity, viability and vigour. However, there are very little information about the comparative performance among breeder seed, foundation seed, certified seed and farmer's seed. Considering the above circumstances the present study was undertaken to assess the performance of different jute seed categories on seed quality and yield of fibre, which could help gathered information for further development of viable technology.

Materials and Methods

An experiment was conducted at Monirampur Jute Research sub-station, Jessore, during the year 1999. The experiment was laid out in a randomized complete block design with 3 replications. The unit plot size of the experiment was 8mx4m. The two varieties namely 0-9897 (*Corchorus olitorius* L.) and CVL-1 (*Corchorus capsularis* L.) were used as the study material. Four categories of seeds namely, breeder's seed, foundation seed, certified seed and farmer's seed were used to study the purity, viability, vigour and yield performance.

Breeder's seed: The improved seed produced from the nucleus seed under the guidance of original plant breeder.

Foundation seed: The seeds produced form breeder's seed on seed multiplication farm under the guidance of technical staff.

Certified seed: The seeds produced from foundation seed, which has been certified by Government Seed Certification Agency.

Farmer's seed: The seeds produced by local farmers. Breeder seed and foundation seed were collected from Bangladesh Jute Research Institute (BJRI). Certified seed was collected from Bangladesh Agricultural Development Corporation (BADC) and ten seed samples produced by local farmer's were collected from Monirampur under the district Jessore and mixed together to make farmer's seed category. Purity of different categories of seed tested in the Agronomy laboratory as per International Seed Testing Association (ISTA, 1966). The purity test was done to estimate the undesirable constituents inside the seed sample and expressed as a percentage by weight. Seed moisture content was determined by oven dry method of Roberts and Roberts (1966). The percentage of moisture content of the seed was determined by the following formula:

$$\text{Moisture content (\%)} = \frac{(m_2 - m_3)}{(m_2 - m_1)} \times 100$$

m_1 = weight of crucible + lid.
m_2 = weight of crucible + lid + fresh seeds.
m_3 = weight of crucible + lid + dried seeds.

Germination was conducted in 9cm plastic petri dishes with a filter paper at the bottom and soaked with 5ml tap water. Each test was carried out with 100 seeds and the petri dishes were kept in a germinator at 32°C ± 1. The germination was recorded after 120 hours and then calculated the germination percentage. Germination was counted at every 24 hours interval to calculate the vigour. The first sprouting of the radical up to 1cm was considered as germination. Viability, seed vigour and 1000 seeds weight were calculated as per rules set down by ISTA, (1966). Vigour value of the seed samples were obtained by following formula of Jain and Saha (1971)

Vigour value = a/1 + b/2 + c/3 + ...

where, a, b and c are the number of seeds germinated after 1, 2

and 3 days. The final count was made at the end of th5 day. Each category of both O-9897 and CVL-1 seeds were sown on April 12, 1999 for fibre production. Seed rate was 5 kg ha^{-1} for O-9897 and 7kg ha^{-1} for CVL-1. Weeding and thinning were done after 20 and 45 days. Fertilizers were applied at the rate of kg ha^{-1}; 100N, $50P_2O_5$, $90K_2O$ and 11S for both the varieties. Disease incidence and varietal mixture were monitored carefully. The crops were harvested on August14, 1999. The fibre yield and yield contributing characters data were collected, compiled and analyzed statistically by Gomez and Gomez (1984).

Results and Discussion

The results in Tables 1&2 show that the breeder seed of both O-9897 and CVL-1 varieties were 100% pure. Purity of foundation seed and certified seed decreased slightly but farmer's seed decreased largely. Farmer's seed of O-9897 contained 7% inert material, 4.5% other crop seed, 5% weed seed and 4.5% other variety and CVL-1 contained 12.50% inert material, 5% other crop seed, 5% weed seed and 4.5% seeds other variety. Thousand seeds weights were very much closed among the seed

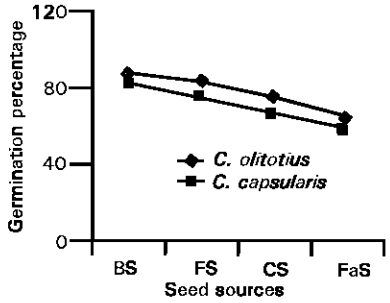

Fig. 1: Germination of BS, FS, CS and FaS in petri dish

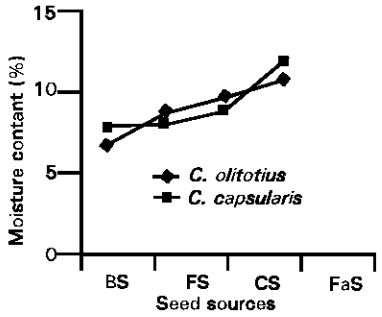

Fig. 2: Moisture content of BS, FS, CS and FaS

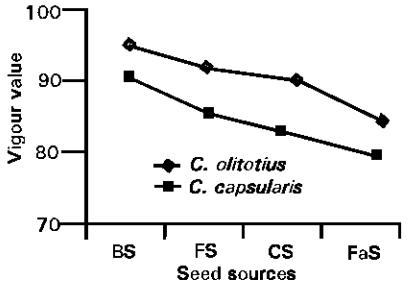

Fig. 3: Vigour value of BS, FS, CS and FaS

categories. In O-9897, the highest weight of 1.97gm observed in farmers seed and the lowest of 1.92gm in foundation seed. Similar results were found in variety CVL-1, where highest weight of 3.15gm in farmers seed and lowest of 2.95gm in breeder seed and foundation seed was observed. Breeder seed was stored in closed tin, foundation and certified seeds were in polyethylene bag and farmer's seed was stored in earthen pot (Tables 1 & 2).

Germination percentage of breeder seed (BS), foundation seed (FS), certified seed (CS) and farmer's seed (FaS) of O-9897 were 96, 90, 85 and 70% respectively (Fig. 1), while the germination percentage of the same for CVL-1 were 90, 82, 73 and 65% respectively. The highest percentage of germination was in breeder seed and the lowest was observed in seeds obtained from farmers. It was observed that most of the seeds were germinated within 24 hours at 32°C ± 1 in petri dish. Only a few seeds were germinated after 48 hours.

Different categories of seeds contained different levels of moisture. Breeder seed, foundation seed, certified seed and farmer's seed of O-9897 contained 7, 9, 10 and 11.50% moisture respectively (Fig. 2). Similar trend was observed in breeder seed, foundation seed, certified seed and farmer's seed (8, 8.50, 9.50 and 12.50% of moisture content respectively) of CVL-1. It was observed in both the species that the farmer's seed contained the highest moisture.

The breeder seed of O-9897 gave the highest vigour value (96.87), followed by foundation seed (94.42), certified seed (91.17) and farmer's seed (85.71) (Fig. 3). On the other hand, in case of CVL-1, the highest vigour value was observed in breeder seed (91.66) and followed by foundation seed (86.58), certified seed (84.24) and farmer's seed (80.76). The lowest value was calculated in farmer's seed for both the species.

Different categories of seed showed variation in germination, moisture content, vigour value, disease infestation, seed weight and fibre yield. Most of the seeds of both O-9897 (*C. olitorius)* and CVL-1 (*C. capsularis)* germinated in 24 hours at 32°C ± 1 temperature. The present findings are in agreement with the findings of Jain and Saha (1971), Khandakar (1980). However, the present finding does not support the findings of Verma and Arora (1978), who observe that *C. capsularis* required 8 days and *C. olitorius* required 5 days at 30°C to give complete germination. Khandakar (1980) reported that the factors like moisture, temperature, proportion of infected seeds in storage, presence of foreign materials, activity of insects in seed lot, availability of oxygen to seed and it associated micro flora and fauna were related to the seed viability in storage. Barton (1954) had shown that reduction of moisture content extends the life of Douglas Fir and Western Hemlock seeds, even at the very favorable temperature of −18°C. Weibull (1955) had shown that cold storage at −20° C is good for maintaining the viability of many kinds of vegetable seeds with the exception of parsley seeds, which reached adversely at the temperature. Wahab and Ali (1976) showed that farm level storage gave seed viability of 76% for *C. capsularis* and 66% for *C. olitorius* at sowing time in March-April. The International Seed Testing Association (ISTA, 1966) had prescribed that seeds should be counted for 5 days in both *C. capsularis* and *C. olitorius* species.

Amendment of ISTA prescription by Verma and Arora (1974) and suggested that 8 days germination count for *C. capsularis* and 6 days for *C. olitorius*. Farmer's seed was stored in earthen pot, which lost viability. The present research findings agreed with the findings of Ali (1963), who showed that seeds stored in gunny bag and in earthen pots lost viability much earlier than seeds stored in closed tin and in glass bottles. Ghosh *et al.* (1951) recommended plastic lined gunny bags, Ali (1963) recommended tin cans and; Bhattacharyya and Dutta (1972) recommended double plastic bags for seed storage. Gorecki (1982) observed that pea seeds stored in a high relative humidity and lost the viability and vigour more quickly than those stored in dry air.

In O-9897, the base diameter, green yield and fibre yield differed significantly due to different seed categories. The highest base diameter (23.84 mm), green yield (50.40 t ha^{-1}) and fibre yield (3.20 t ha^{-1}) were obtained from breeder seed and the lowest (16.45 mm, 44.50 t ha^{-1} and 2.32 t ha^{-1}, respectively) from farmer's seed. Plant population and plant height showed insignificant differences among the seed categories. Disease infestation was not observed in breeder seed, foundation seed, and certified seed except farmer's seed (3%). Breeder seed and foundation seed did not show any varietal admixture except

Table 1: Purity of different seed categories of O-9897(*C. olitorius*)

Seed category	Pure seed (%)	Inert materials (%)	Other crop seeds (%)	Weed seeds (%)	Other varieties (%)	1000 seeds weight (gm)	Stored container (at the time of collection)
Breeders seed	100	0.0	0.0	0.0	0.0	1.93	Closed tin
Foundation seed	98	1.5	0.5	0.0	0.0	1.92	Polyethylene bag
Certified seed	93	5.0	2.0	0.0	0.0	1.95	Polyethylene bag
Farmer's seed	79	7.0	4.5	5.0	4.5	1.97	Earthen pot

Table 2: Purity of different seed categories of CVL-1(*C. capsularis*)

Seed category	Pure seed (%)	Inert materials (%)	Other crop seeds (%)	Weed seeds (%)	Other varieties (%)	1000 seeds weight (gm)	Stored container (at the time of collection)
Breeders seed	100	0.0	0.0	0.0	0.0	2.95	Closed tin
Foundation seed	96	2.0	1.0	1.0	0.0	2.95	Polyethylene bag
Certified seed	92	5.0	2.0	1.0	0.0	3.00	Polyethylene bag
Farmer's seed	73	12.5	5.0	5.0	4.5	3.15	Earthen pot

Table 3: Yield and yield contributing characters of O-9897

Seed category	Plant population (000 ha^{-1})	Plant height (m)	Base diameter (mm)	Green weight (t ha^{-1})	Fibre weight (t ha^{-1})	Disease incidence (%)	Varietal admixture (%)
Breeders seed	3.36	4.36	23.84	50.40	3.20	0	0
Foundation seed	3.27	4.22	19.80	47.90	3.07	0	0
Certified seed	3.32	4.31	18.90	46.60	2.98	0	3
Farmer's seed	3.25	3.64	16.45	44.50	2.32	3	19
LSD at 5% level	NS	NS	1.28	2.07	0.71	-	-

NS = Non Significant

Table 4: Yield and yield contributing characters of CVL-1

Seed category	Plant population (000 ha^{-1})	Plant height (m)	Base diameter (mm)	Green weight (t ha^{-1})	Fibre weight (t ha^{-1})	Disease incidence (%)	Varietal admixture (%)
Breeders seed	3.24	4.20	19.30	40.60	3.04	0	0
Foundation seed	3.13	4.17	19.09	38.50	2.74	0	0
Certified seed	3.18	4.05	17.97	38.00	2.42	3	10
Farmer's seed	3.15	3.87	15.40	36.31	2.09	5	22
LSD at 5% level	NS	NS	0.98	1.85	0.69	-	-

NS = Non Significant

certified seed (3%) and farmer's seed (19%) (Table 3).

In CVL-1, the base diameter, green yield and fibre yield influenced significantly due to different seed categories studied. The highest base diameter (19.30 mm), green yield (40.60 t ha^{-1}) and fibre yield (3.04 t ha^{-1}) were found in breeder seed and the lowest were (15.40 mm, 36.31 t ha^{-1} and 2.09 t ha^{-1} respectively) in farmer's seed. Disease incidence and varietal admixture were absent in breeder seed and foundation seed. However, in certified seed, 3% disease and 10% admixture; and in farmer's seed 5% disease and 22% admixture were observed (Table 4).

In terms of quality and yield, breeder seed showed better performance. Foundation and certified seed were in 2nd and 3rd position in all respects. However, the farmer's seed possess the lowest or 4th grade position among the seed categories in respect to seed quality and fibre yield for both 0-9897 and CVL-1.

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