Preliminary Evaluation of *Corchorus* spp. for Resistance to Yellow Mite [*Polyphagotarsonemus latus* (Banks)], Semilooper (*Anomis sabulifera* Guen.) and Stem Weevil (*Apion corchori* Marshall)

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Yellow mite [*Polyphagotarsonemus latus* (Banks)], semilooper (*Anomis sabulifera* Guen.) and stem weevil (*Apion corchori* Marshall) are major economic pests of cultivated jute (*Corchorus* spp.). Eighty accessions of *Corchorus* species were evaluated under field infestation, in an augmented randomized block design, against Yellow mite, semilooper and stem weevil. Based on the damage caused by these pests, accessions WCIN-009, WCIN-006, NYM-2860 (*C. aestuans*); WCIJ-116 (*C. fascicularis*); WCIJ-009, KBA-230 (*C. tridens*); WCIJ-031 (*C. pseudo-capsularis*); WCIJ-121 and WCIJ-132 (*C. trilocularis*) were identified as moderately resistant against one or more of these three pests. It was also found that none of the accessions evaluated showed high level of resistance against all the three pests together. Further studies under greenhouse / artificial infestation conditions are required to substantiate the results.

Key Words: *Corchorus* species, Jute, Screening, Semilooper, Stem weevil, Yellow mite

Jute (*Corchorus capsularis* L. and *C. olitorius* L.), an important fibre crop is cultivated mainly in the north-eastern region comprising states of West Bengal, Assam, Bihar, Orissa, Uttar Pradesh and some parts of Meghalaya and Tripura. The yellow mite [*Polyphagotarsonemus latus* (Banks)], semilooper (*Anomis sabulifera* Guen.) and stem weevil (*Apion corchori* Marshall) are the major economic pests of jute in India. The damage caused varies with the pests (Singh, 1981). Jute stem weevil exists throughout the jute crop season (i.e. March-July) and causes damage to the crop from early stage till harvest. Female weevil punctures the stem near base of petiole for egg deposition and developing grub tunnels into pith damaging the fibre tissue. A 'knot' is formed at the point of injury that causes defect in fibre quality. The green semilooper appears in the field in the first week of June and continues to damage the jute plants till harvest. The larvae damage tender apical leaves of jute plants causing reduction in growth and consequently fibre yield. In severe cases, semilooper larvae destroy the growing points, which induce branching thus affecting both fibre yield and quality. The yellow mite feeds on the apical leaves, which roll and bend, consequently arresting the growth. It appears in field in the first week of May and continues to damage the crop for about two months.

A number of management strategies have been investigated to prevent crop losses from these pests. These methods include selection of resistant varieties, suitable date of sowing, inter-cultural operations, use of insecticides/ bio-pesticides and crop rotation (Das and Singh, 1999). The objective of this study was to evaluate germplasm of wild and cultivated *Corchorus* species for resistance to the major insect-pests under field conditions, which would provide useful information for breeding resistant varieties against these pests.

Materials and Methods

The experimental material (Table 1) for the present investigation consisted of 80 accessions of *Corchorus* species collected under International Jute Organization (IJO) Germplasm Project (1988-89) and National Agricultural Technology Project – Conservation of Agrobiodiversity (Sustainable Management of Plant Biodiversity: Jute and Allied Fibres). Of these, 67 accessions belonged to seven wild species and 13 accessions to cultivated species (*C. capsularis* and *C. olitorius*). The accessions were screened for resistance to yellow mite, semilooper and stem weevil under conditions of natural infestation in the field at Central Research Institute for Jute and Allied Fibres, Barrackpore (22° 45' N, 88° 16' E and 30 m altitude) in March. The experimental material was grown in an augmented randomized complete block design with four checks in four blocks. Each entry was grown in a single row, 3 m long. The rows were 30 cm apart, and plants were thinned to a spacing of 7-10 cm within the row. Recommended agronomic practices were used for raising the crop. No insecticide/fungicide was applied during the growth of the crop.

Jute yellow mite, semilooper and stem weevil damage was assessed visually. Based on the extent of incidence,

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Table 1. Yellow mite, semilooper and stem weevil incidence (mean values) in different *Corchorus* species evaluated during 2002

Species	Accession	Source country	Incidence percentage (mean)		
			YM	SL	SW
C. aestuans	WCIJ-037	Tanzania	28.32 (34.19)*	31.44 (30.86)	29.09 (27.31)
	WCIJ-044	Tanzania	9.92 (15.79)	23.22 (22.64)	1.01 (0.00)
	WCIJ-100	Tanzania	22.28 (18.67)	–1.70 (0.00)	16.21 (18.67)
	WCIJ-135	Tanzania	29.59 (31.48)	17.61 (17.55)	24.33 (25.24)
	WCIJ-153	Thailand	26.44 (32.31)	22.78 (22.20)	20.88 (19.10)
	WCIJ-144	China	22.84 (28.71)	0.58 (0.00)	21.63 (19.85)
	WCIN-009	India	15.06 (20.93)	0.58 (0.00)	13.68 (11.90)
	WCIN-005	India	20.70 (26.57)	17.01 (16.43)	28.35 (26.57)
	WCIN-003	India	15.93 (21.80)	0.58 (0.00)	26.31 (24.53)
	WCIN-006	India	8.16 (14.03)	0.58 (0.00)	1.78 (0.00)
	WCIN-007	India	28.58 (30.47)	0.06 (0.00)	16.11 (17.02)
	WCIN-008	India	26.72 (30.61)	22.69 (22.63)	24.57 (25.48)
	YBM-78	India	28.46 (34.33)	0.58 (0.00)	1.78 (0.00)
	NYM-2855	India	20.70 (26.57)	0.58 (0.00)	1.78 (0.00)
	NYM-2860	India	19.61 (25.48)	0.58 (0.00)	17.57 (15.79)
	NYM-2846	India	37.83 (33.68)	12.36 (11.30)	12.90 (11.30)
	NYM-2835	India	28.98 (25.37)	–1.70 (0.00)	16.17 (18.63)
	KBA-186	India	25.95 (21.80)	1.06 (0.00)	1.60 (0.00)
C. fascicularis	WCIJ-005	Kenya	35.02 (40.89)	32.89 (32.31)	42.67 (40.89)
	WCIJ-014	Kenya	37.34 (39.23)	26.63 (26.57)	35.36 (36.27)
	WCIJ-025	Kenya	11.03 (12.92)	20.76 (20.70)	30.72 (31.63)
	WCIJ-028	Kenya	20.65 (22.54)	29.07 (29.01)	19.15 (20.06)
	WCIJ-052	Kenya	15.30 (21.17)	0.58 (0.00)	22.95 (21.17)
	WCIJ-085	Kenya	15.38 (11.77)	23.96 (25.66)	14.32 (16.78)
	WCIJ-116	Kenya	5.45 (7.34)	18.33 (18.27)	–0.92 (0.00)
	WCIJ-055	Tanzania	20.60 (22.49)	20.49 (20.43)	27.03 (27.94)
	WCIJ-140	Tanzania	12.29 (14.18)	18.49 (18.43)	21.06 (21.97)
	WCIJ-086	Thailand	13.07 (14.96)	23.28 (23.22)	11.94 (12.85)
C. pseudo-capsularis	WCIJ-007	Kenya	28.80 (24.65)	18.21 (17.15)	18.74 (17.14)
	WCIJ-031	Kenya	16.54 (18.43)	15.95 (15.89)	-0.92 (0.00)
	WCIJ-041	Tanzania	26.52 (22.91)	-1.70 (0.00)	15.09 (17.55)
C. pseudo-olitorius	WCIJ-034	Kenya	10.23 (16.10)	14.48 (13.90)	13.08 (11.30)
	WCIJ-092	Kenya	14.72 (16.61)	16.42 (16.36)	9.35 (10.26)
	WCIJ-125	Kenya	16.69 (13.08)	14.40 (16.10)	6.75 (9.21)
C. tridens	WCIJ-009	Kenya	19.87 (16.26)	16.54 (18.24)	17.60 (20.06)
	WCIJ-017	Kenya	44.35 (40.20)	1.06 (0.00)	25.69 (24.09)
	WCIJ-042	Tanzania	3.61 (0.00)	22.39 (24.09)	17.01 (19.47)
	WCIJ-068	Kenya	42.84 (39.23)	37.53 (39.23)	24.11 (26.57)
	WCIJ-149	Tanzania	30.31 (26.16)	17.83 (16.78)	23.47 (21.87)
	WCIJ-137	Tanzania	17.24 (13.63)	33.56 (35.26)	21.63 (24.09)
	WCIJ-147	Tanzania	25.80 (22.20)	30.61 (32.31)	19.74 (22.20)
	KBA-230	India	19.94 (15.79)	1.06 (0.00)	1.60 (0.00)
	NYM-2863	India	51.67 (47.60)	1.06 (0.00)	1.60 (0.00)

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Table 1 Contd...

Species	Accession	Source country	Incidence percentage (mean)		
			YM	SL	SW
C. trilocularis	WCIJ-008	Kenya	26.83 (23.22)	21.52 (23.22)	17.01 (19.47)
	WCIJ-016	Kenya	40.69 (37.08)	-1.70 (0.00)	34.62 (37.08)
	WCIJ-022	Kenya	17.05 (13.44)	17.50 (19.20)	14.08 (16.54)
	WCIJ-026	Kenya	18.32 (14.71)	19.35 (21.05)	15.66 (18.12)
	WCIJ-033	Kenya	13.95 (10.34)	16.42 (18.12)	23.64 (26.10)
	WCIJ-061	Kenya	20.46 (16.31)	22.32 (21.26)	17.91 (16.31)
	WCIJ-065	Kenya	22.34 (18.19)	21.49 (20.43)	19.79 (18.19)
	WCIJ-071	Kenya	21.70 (17.55)	18.61 (17.55)	16.73 (15.13)
	WCIJ-079	Kenya	31.08 (26.93)	1.06 (0.00)	17.70 (16.10)
	WCIJ-091	Kenya	23.08 (19.47)	19.71 (21.41)	9.70 (12.16)
	WCIJ-103	Tanzania	23.62 (19.47)	18.40 (17.34)	21.07 (19.47)
	WCIJ-111	Kenya	17.41 (13.26)	28.37 (27.31)	22.86 (21.26)
	WCIJ-121	Kenya	11.61 (13.50)	0.06 (0.00)	12.59 (13.50)
	WCIJ-039	Tanzania	24.85 (20.70)	25.79 (24.73)	20.03 (18.43)
	WCIJ-131	Tanzania	17.59 (13.44)	35.77 (34.71)	27.38 (25.78)
	WCIJ-132	Tanzania	16.08 (17.97)	0.06 (0.00)	17.06 (17.97)
	WCIJ-133	Tanzania	4.15 (0.00)	30.33 (29.27)	20.84 (19.24)
	WCIJ-134	Tanzania	22.71 (19.10)	25.87 (25.57)	19.74 (22.20)
	KBA-62	India	4.15 (0.00)	46.06 (45.00)	25.69 (24.09)
	KBA-80	India	30.31 (26.16)	17.84 (16.78)	23.47 (21.87)
	KBA-222	India	20.25 (16.10)	24.15 (23.09)	14.68 (13.08)
	KBA-227	India	21.97 (17.82)	31.06 (30.00)	16.08 (14.48)
C. urticifolius	WCIJ-070	Kenya	31.89 (37.76)	21.28 (20.70)	16.26 (14.48)
	WCIJ-112	Kenya	38.87 (35.26)	35.56 (35.26)	32.80 (35.26)
C. capsularis	CIM-022	India	29.43 (31.32)	25.54 (25.48)	18.28 (19.19)
	CIN-012	India	33.36 (39.23)	15.54 (14.96)	28.35 (26.57)
	CIN-088	India	33.36 (39.23)	19.01 (18.43)	16.74 (14.96)
	CIN-358	India	38.87 (35.26)	20.93 (22.63)	13.33 (15.79)
	CEX-012	Taiwan	32.20 (34.09)	0.06 (0.00)	18.84 (19.75)
	CEX-054	Brazil	35.29 (31.68)	13.52 (15.22)	22.07 (24.53)
C. olitorius	OIJ-018	Kenya	22.20 (24.09)	27.63 (27.57)	19.27 (20.18)
	OIJ-026	Kenya	20.31 (22.20)	22.26 (22.20)	14.59 (15.50)
	OIJ-097	Tanzania	25.93 (31.80)	0.58 (0.00)	18.56 (16.78)
	OIJ-229	Nepal	26.67 (28.56)	9.78 (9.72)	25.66 (26.57)
	OIN-046	India	16.30 (18.19)	18.97 (18.91)	20.14 (21.05)
	OIN-507	India	31.21 (37.08)	0.58 (0.00)	1.78 (0.00)
	OMU-017	India	26.15 (32.02)	0.58 (0.00)	27.44 (25.66)
Varietal mean	N = 80		22.99	15.91	18.26
Checks	JRO 524		8.80 (17.15)	5.73 (11.84)	11.42 (19.13)
	JRO 632		18.60 (25.29)	15.01 (22.60)	12.64 (20.73)
	JRO 878		26.60 (31.01)	9.64 (15.73)	8.38 (16.37)
	JRC 212		24.43 (28.72)	14.79 (21.74)	10.91 (18.92)
	JRC 321		31.41 (33.79)	19.21 (25.88)	11.02 (19.36)
Check mean	N =5		27.19	19.56	18.50
LSD (0.05)	N = 80		12.15	21.76	11.13

YM = Yellow mite, SL = Semilooper, SW = Stem weevil, * = Angular values in parenthesis the plants were rated for pest damage using the scale: highly resistant (infestation 0.00 %), resistant (infestation from 1-10 %), moderately resistant (infestation from 11-20 %), moderately susceptible (infestation from 21-50 %), susceptible (infestation from 51-75 %) and highly susceptible (infestation from 76-100 %). The incidence percentage values calculated on the basis of number of plants infested in a row were transformed using inverse sin angular transformation. Although no artificial infestation was done, field level infestation was high during the crop growth period. The statistical analysis was done using Indostat statistical software package, developed by Indostat Pvt. Ltd., Hyderabad, India.

Results and Discussion

Yellow Mite

Significant differences were detected in accessions of wild species evaluated for yellow mite damage. Out of 80 accessions (Table 1), 2 accessions each of *C. aestuans* WCIJ-044 (9.92 %), WCIN-006 (8.16 %) and *C. trilocularis* KBA-62 (4.15 %), WCIJ-133 (4.15 %); one each of *C. fascicularis* WCIJ-116 (5.45 %) and *C. tridens* WCIJ-042 (3.61 %) were resistant to yellow mite. All the accessions of *C. pseudo-olitorius* (WCIJ-034, WCIJ-092, WCIJ-125) were moderately resistant to yellow mite. Amongst wild species, accessions WCIJ-017 (44.35 %) and NYM-2863 (51.67 %) of *C. tridens* were moderately susceptible and susceptible, respectively. None of the accessions were highly susceptible to yellow mite.

Semilooper

Among the 80 accessions (Table 1) tested, 2 of *C. aestuans* (WCIJ-100, NYM-2835); one of *C. pseudo-capsularis* (WCIJ-041) and one of *C. trilocularis* (WCIJ-016) were highly resistant to semilooper infestation. Accessions of *C. pseudo-olitorius* WCIJ-034 (14.48 %), WCIJ-092 (16.42 %) and WCIJ-125 (14.40 %) were moderately resistant to semilooper infestation. Maximum mean damage percentage was observed in accessions of *C. trilocularis* KBA-62 (46.06 %) followed by WCIJ-068 (37.53 %) of *C. tridens*. None of the accessions were highly susceptible to semilooper infestation.

Stem Weevil

Five aceessions of *C. aestuans* (WCIJ-044, WCIN-006, YBM-78, NYM-2855, KBA-186); one each of *C. fascicularis* (WCIJ-116), *C. pseudo-capsularis* (WCIJ-031), *C. trilocularis* (WCIJ-091) and two of *C. tridens* (KBA-230, NYM-2863) exhibited resistance against stem weevil infestation. Accessions WCIJ-034, WCIJ-092 and WCIJ-125 of *C. pseudo-olitorius* were moderately resistant to stem weevil infestation. Maximum mean damage percentage was observed in accession of *C. fascicularis* WCIJ-005 (42.67 %) and *C. trilocularis* WCIJ-016 (34.62 %).

Among cultivated species, accessions CEX-012, OIJ-097, OIN-507 and OMU-017 were identified as resistant genotypes to semilooper infestation. Amongst check varieties, JRO 524 was found resistant to yellow mite (8.80 %) and semilooper (5.73 %) infestation and moderately resistant against stem weevil (11.42 %). However, JRO-878, JRC 212 and JRC 321 were moderately susceptible to yellow mite infestation. Chaudhury *et al.* (1999) reported that in tossa jute accessions KEN/DS/041 and KEN/DS/061 were identified as donor parents for resistance on the basis of low incidence of jute semilooper. Similarly, Palve *et al.* (2002) also found accessions of wild species *C. aestuans*, *C. trilocularis* and *C. tridens* highly resistant against semilooper infestation.

Accessions of wild species of *Corchorus* identified for resistance to these major pests can be used in interspecific hybridization for improving cultivated varieties of jute. Further studies under artificial infestations are needed for confirming the results obtained under natural infestation.

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