poric material was incorporated into each plot at a varying rate of 10 to 25 g/100 m². 'Protector' rows of maize (a local tall cultivar) were planted around the plots 21 days prior to the main sowing plot, to obstruct movement of sporangia from plot to plot and also to raise the humidity within the plots[3]. The parameters quantified were, percentage incidence 30 days after planting and percentage infection index calculated from severity ratings as per the method of Deshmukh *et al*[3] and Deshmukh and Mayee[4]. Grain and straw yields were obtained from each block. Disease incidence in various blocks ranged from 24.4% to 98.1% while the intensity varied from 18.1% to 75.1%.

Near perfect negative correlation existed between incidence and grain yield ($r = -0.9895$**) and intensity and grain yield ($r = -0.9859$**). While high positive correlation occurred between incidence and straw yield ($r = 0.9446$**) and intensity and straw yield ($r = 0.9273$**). The relationship for data within the range of disease incidence and intensities was linear (figure 1) and hence regression functions were worked out. The regression equations obtained were: $Yg = 14.69 - 0.11\%$ INF-30, $Yg = 15.05 - 0.16$ INFINDX, $Ys = 25.80 + 0.35\%$ INF-30 and $Ys = 19.56 + 0.48$ INFINDX, where Yg is the estimated grain yield and Ys the estimatd straw yield. It was evident from the analysis that with every 10% increment of disease incidence (% INF), the grain yield loss was 1.07 Q/ha while with every 10% increment in intensity (INFINDX) grain yield reduced by 1.48 Q/ha. Since, downy mildew disease is characterized by the transformation of floral organs into leafy structures, it was obvious that the increase in the disease is associated with an increase in straw yield. Mogle and Mayee[5] have demonstrated that downy mildew infection resulted in 37–48% reduction in the height and 25% reduction in the dry matter weight, of the susceptible pearl millet host and hence greater reduction in grain yield is often expected. The results further indicate that the intensity is a closer representation of grain yield loss than incidence.

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QUANTITATIVE ESTIMATION OF DIOSGENIN IN DIFFERENT POPULATIONS OF *COSTUS SPECIOSUS*

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Diosgenin, one of the active sapogenins, is usually found in different species of *Dioscorea*. But in the present paper *Costus speciosus* is selected for the extraction of diosgenin, as it is widely available in different parts of India and also grows more profusely than *Dioscorea*.

Extensive collections of *Costus speciosus* had been made from different parts of India, and had been grown in the University garden, Department of Botany. Among different populations collected so far, ten were estimated by the method of Sanchez *et al*[1].

Rhizomes of different populations of *Costus speciosus* were collected during the active period of growth, washed thoroughly, dried for 24-28 hr at 28-30° C and then at 70° C to maintain constant weight.

Hydrolysis of dried rhizomes was done in 2.5N HCl for 4–6 hr on a steam bath. After hydrolysis, the rhizomes were washed repeatedly with distilled water to make them acid free and dried again at 70° C.

The dried rhizomes were then extracted in a Soxhlet extractor with petroleum ether for 30–32 hr. The solvent was removed by distillation and the crude sapogenin residue was weighed. Diosgenin was isolated from this sapogenin residue by thin-layer chromatography. The concentration of diosgenin was determined by spectrophotometric method, as described below.

Crude sapogenin residue (1 mg) of each population was dissolved in 1 ml of chloroform and spots were developed on activated thin-layer silica gel plates. For identificaition of diosgenin, a spot of standard diosgenin was also obtained. In each plate one lane was left free to be used as a blank.

For separation of different components, chromatograms were developed in chloroform: acetone (80:20) solvent system, visualization was done with iodine vapour, the areas of diosgenin corresponding to standard ones were marked and the iodine was eliminated by keeping the plates in the incubator at 100° C for 15 min.

TABLE 1

Results obtained in different populations of Costus speciosus Smith

Populations Place	Dry wt of the rhizomes (g)	Wt of crude sapogenin (mg)	Percentage of diosgenin by TLC
IV Lucknow	123	600	2.25
VII Lucknow	134	1000	—
X Jammu	141	2377	5.0
XI Bankura	120	1275	3.38
XII Burdwan	116	906	1.25
XIII Coimbatore	36	400	1.50
XIV Dhalgaon	146	1000	4.13
XV Mungpoo	155	850	2.63
XVI New Jalpaigudi	17	450	4.63
XVII Sukhna	68	600	—

The diosgenin zone was stirred with 5 ml of methanol, centrifuged at 1500 RPM for 5 min, the supernatant was evaporated to dryness on a steam bath. The residue was cooled and 4 ml of conc. sulphuric acid : methanol (80:20) mixture was added, allowed to stand for 2 hr and the resulting chromatophore was measured spectrophotometrically at 400–417 nm against the blank. Concentrations of diosgenin content in different populations were determined from the standard curve.

Chemical analysis of the rhizome samples, obtained from various parts of the country, indicated a wide range in the diosgenin content; the sample obtained from Jammu[4] yielded a higher content than those obtained from other parts. Out of the collections made so far, a few elite clones have been identified. Investigations on the economics of the samples are in progress.

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PHENOMENA OF INFECTION IN ERGOT DISEASE OF PEARL MILLET

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PEARL millet (*P. typhoides* (Burmf.) Stapf. and Hubbard) is mainly a rain-fed widely cultivated crop constituting the staple human food in addition to proved forage crop. Late sown crop[1-3] usually gets severely infected with *Claviceps fusiformis* (Loveless)[4,5]. Infected spikelets under favourable climatic conditions get transformed into long crescent shaped sclerotia[5,8]. During continuous rainy days, most of the mature sclerotia fall on the ground, some of them which get burried deep in soil get degenerated[6,7] with time, while some of the surface lying sclerotia germinate and produce apothecia bearing asci. But the number of sclerotia undergoing germination is very rare[6]. King[9] in Nigeria and Bhat[4] in India found the samples collected from consumer market contaminated with sclerotia, which got mixed during thrashing process. Sundaram[8] realised the probability of seed-borne nature of the infection.

Sclerotia was scattered on the soil surface of a Bajra field immediately after harvest in an area of 10 × 10 m and was marked for future use. Correspondingly during the next season two plots of 5 × 3 ft size, well isolated from each other were sown with HB_3 variety of Bajra. The seeds were dressed with Ceresan before sowing. Sorghum was sown on border to check the invasion by the air borne inoculum from other fields. At a far off distance a check plot was run simultaneously. At flowering stage waxed slides were temporarily attached with the stems of plants at varying heights respectively at 18, 36, 52 and 72 inches from ground level at varying physiological stages of the plants. Slides were removed respectively after 12, 24 and 36 hr. after fixing for microscopic examination. The same experiment was repeated in 1978, 1979 and 1980. The slides picked up after different intervals were found to have trapped conidia of *C. fusiformis* (Loveless) along with other pathogenic and non-pathogenic forms of fungi. During the period of observations, a survey of whole Bajra field and surrounding *Sorghum* trail field was done for possible inoculum source but no infection was traceable even in adjacent fields. Laboratory studies with sclerotia also supported the concluded infection process. Intact and broken pieces of sclerotia kept on the surface of autoclave sterilized and unsterilized field soils respectively after 48 to 72 hr were found covered with mycelial covering bearing numerous conidia.

The above observation suggests that conidia plays an equally important role in incitation of primary infection along with the rare sclerotia which on germi-