allantoid, biseriate, unicellular, subhyaline, light olivaceous grey, measure 4–8 × 1–2 μm.

Eustromata diatrypoidea, omnino ex tantum fungosus texta, globosa, elongata, sparsa 1–3 mm lata, Pagina superni rugatus cum altus ostiolatus, 10–20 perithecio in stromata. Perithecio globosa vel subglobosa, asymmetrica bistratosa, congesta, ad lata longa collum, dispositi parallelae inter se, 150–350 μm alta et 250–350 μm lata, cum 80–260 μm longa et 40–80 μm lata collum. Asci clavati, stipitati, octospori, subhyalini 20–30 × 5–7 μm. Ascosporae allantoideae, biseriateae, unicellulareae, olivaceo-griseae 4–8 × 1–2 μm.

In ligno putrido *Mimusops elengi* L.

Holotypus: AMH—3299, on *Mimusops elengi* L.

Typus locus: Khandala, Maharashtra State.

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HYDOCYANIC ACID CONTENT, A BIOCHEMICAL MARKER FOR REACTIONS TO POWDERY MILDEW IN LINSEED

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LINSEED (*Linum usitatissimum* L.) is an important oil seed crop in India. Besides other diseases, powdery mildew caused by *Oidium lini* (Skoric) is responsible for severe yield losses annually. The presence of HCN in linseed plants has been reported earlier too[1]. Attempts have been made in this investigation to ascertain correlation, if any, with the HCN content in linseed cultivars to their reactions against powdery mildew. Estimation of HCN content in some linseed varieties with known reactions to powdery mildew was made with a modification over earlier report[2].

During the 'rabi' season of 1979–80, two resistant varieties of linseed, EC 77959, EC 1456; two moderately resistant EC 12351, Nimalini and two susceptible varieties–Mahoba local, Kangra local were grown in the field, with uniform fertility level at the Regional Station, I.A.R.I. Kanpur. For the estimation of HCN content thirty days old seedlings of these cultivars were used. Top leaves of these cultivars (1 g) were ground in cold (4–6° C) 0·2 M phosphate-buffer (pH 7·0) separately. These were centrifuged at 4000 r.p.m. for 15 minutes at 4° C and the supernatents were collected and used for quantitative estimation of HCN. The volume of the supernatents in each case was made to 10 ml by adding cold water. Two strips (5 × 1 cm) of Whatman filter-paper No. 1, saturated with sodium picrate solution (25 g sodium carbonate + 5 g picric acid in 1000 ml distilled water) were immediately suspended in the tubes containing supernatent from each cultivar. In order to get easy release of cyanide 1·3 ml of 3N HCl was added to each of these tubes before suspending the filter-paper strips. These tubes were kept at 60° C for 30 minutes. Later, these were brought to room temp. (23 ± 2° C). The observed cyanide was measured with spectronic–20 (U.S.A.) at 515 μ. The standard were also run alongwith experiment taking 0·0, 5·0, 7·5, 10·0, 20·0 20·0, 25·0, 30·0 μg cyanide (241 mg. of KCN/litre). The experiment was run in triplicate. The results are presented in Table I.

It is seen that the HCN content varies in different linseed varieties considerably. Varieties of indigenous origin like Mahoba and Kangra local carry low HCN content as against the exotics like EC 12351, EC 1456 and EC 77969. Himalini (released for cultivation in Himachal Pradesh) has K_2 in its parentage and this in turn has been derived from a cross with an unknown exotic variety[3]. Similarly more than fifty varieties of linseed were screened for the relation of HCN content against the disease development and an inverse correlation was found. The leaf exudate study was undertaken indirectly by adhering a sodium picrate paper

TABLE I

HCN content in six linseed cultivars with maturity periods and reactions to powdery mildew

Sl. No.	Cultivars	Amount of HCN μg/g of fresh wt.	Maturity in days	Reaction of cultivars to powdery mildew
1.	EC 77959	187·0	140–145	R
2.	EC 1456	193·0	140–145	R
3.	Himalini	155·0	135–140	MR
4.	EC 12351	146·0	125-130	MR
5.	Mahoba local	19.0	125–130	S
6.	Kangra local	23.0	130–135	S

R = Resistant, MR = Moderately resistant, S = susceptible,

strip on the leaf surface, kept in the growth chamber, at 28 ± 2° C for five hours and visible reading of colour development were noted. The strip adhered to resistant line turned dark red (showing more of HCN evolution). The colour was light pink in moderately resistant and remained yellow in susceptible plants. The colour development was in line with the calorimetric measurement of their relative amount of HCN content.

For phyllosphere study in laboratory, the plants were grown asceptically in sterilized soil in growth chamber (Light 16 hours, R.H. 70–75%, temperature 25 ± 2° C). Oidia strains from different agroclimatic regions were collected. 'Fd'-strain was isolated from cultivar 'Mukta' at Faizabad, 'KM', strain from 'Mahoba local' at Mahoba (Distt. Jhansi, U.P.) and 'KI' strain foom 'Neelam' at I.A.R.I. Reg. Stn., Kanpur. These strains were maintained on respective susceptible cultivars in laboratory. Oidia were dusted on glass slide and put under microscope. Single oidium was isolated with the help of fine pointed glass needle and inoculated on the leaves of 'Mahoba local' (susceptible to all three strains) and maintained in a spore proof cage.

To determine the reaction of different cultivars against each strain of *Oidium lini*, fifteen days old seedlings were artificially inoculated. The oidal suspension was sprinkled over leaf surface with the help of automizer forming fine droplets. Inoculated plants were transfered to growth chamber. The perfection of technique was tested under microscope and found even distribution of oidia over leaf surface.

Disease was assessed in the laboratory in three grades namely: R (resistant)—no visible symptom of disease; MR (moderately resistant)—most of the lower leaves had visible infection showing white fungal growth; S (suscetpible)—whole plants covered with thick layer of fungal growth and the tender parts are badly affected. The three strains were tested in triplicate in pots on six cultivar mentioned in Table II.

It is observed (Table II) that resistant cultivar having high amount of HCN (187–193 μg/g) did not show the disease symptoms, *i.e.*, they were resistant to all the three strains. However, cultivar Himalini and EC 12351 showed varied response, *i.e.*, cultivag Himalini was resistant to Fd and KI strain but moderately resistant to KM strain and EC 12351 was moderately resistant to all the three strains. Susceptible cultivars–Kangra local and Mahoba local having least amount of HCN (19–23 μg/g) showed disease symptoms with all the three strains.

The spore germination was studied on the leaf of susceptible (S), moderately resistant (MR) and resistant (R) plants kept in the growth chamber for disease development. The fresh oidia of KI strains were inoculated over the attached leaf surface and the spore germination and germ tube formation were measured at 10 and 24 hour of inoculation with the method used by Russel *et al.*[4] The data is represented in Table III.

TABLE II

Response of three strains of Oidium lini (*skoric*) *on six cultivar of linseed*

Sl. No.	Cultivar	Response to the strain		
		Fd.	KM	KI
1.	Kangra local	++	++	++
2.	Mahoba local	++	++	++
3.	Himalini	−	+	−
4.	EC 12351	+	+	+
5.	EC 1456	−	−	−
6.	EC 77959	−	−	−

(−) = Resistant; + = Moderately resistant; (++) = Susceptible.

TABLE III

Rate of oidial germination and germ tube growth on the leaf surface of six cultivars of linseed showing varied response to powdery mildew.

Sl. No.	Cultivar	Response to powdery mildew	* Oidial germination in %		Rate of germ tube growth in μm	
			10 hr.	24 hr.	10 hr.	24 hr.
1.	Mahoba local	S	32	60	15·5	46·0
2.	Kangra local	S	30	62	13·5	39·5
3.	Himalini	MR	25	45	9·0	28·0
4.	EC 12351	MR	24	36	11·25	25·5
5.	EC 1456	R	10	15	4·5	18·6
6.	EC 77959	R	12	18	6·75	20·0

* Data represents average of 3 replications,

It is evident from the data that oidial germination and germ tube growth on the leaf of resistant cultivar was very little. Moderate resistant cultivars had poor germination and fungal growth. The susceptible cultivars had very high percentage of germination (30–60%) and high rate of germ tube formation.

Normally, field observations and technique for the artificial determination of reaction to obligate parasite, powdery mildew on linseed are time consuming and arduous. The technique discribed herein, will facilitate quick assay of linseed varieties to locate donors for resistance against the fungus, before the material comes to flowering stage.

Varieties with high HCN content such as EC 77959 and EC 1456 are resistant to powdery mildew. Whereas the susceptible varieties are poor in the HCN content.

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A NOTE ON THE KARYOMORPHOLOGY OF *HIPTAGE BENGHALENSIS* (L.) KURZ.

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Hiptage benghalensis (L.) Kurz. (*H. madoblota* Geartn.) belonging to the family Malpighiaceae is a large straggling shrub and distributed throughout hotter parts of India. This species is chiefly grown in garden for its fragrant pretty white flowers. Its chromosome number was reported earlier as $2n = 58$ by Pal[1] and $2n = 42$ and 56 by Roy *et al.*[2]. Thus the chromosome numbers of this species reported so far do not agree with one another. Hence the present work was undertaken to determine the correct chromosome number and also to study their karyomorphology.

Material for the present study was collected from Lal Bagh, Bangalore and planted in the Botanical Garden of this University. Root tips from potted plants were pretreated with saturated solution of alpha bromonaphthaline for one and half hours and fixed in acetic alcohol (3 : 1) for overnight. Root tips were hydrolysed in 1 N HCl, stained in fuelgen and squashed in 45% acetic acid. The chromosome length and the type are given in Table 1.

Somatic complement of the species contained $2n = 58$ chromosomes (Figs. 1 and 2). This is in confirmation of previous report by Pal. Depending upon the size, the chromosomes were classified under following types :

Type A—Chromosomes more than 2·50 microns in length.

Type B—Chromosomes less than 2·50 microns and more than 2·00 microns in length.

Type C—Chromosomes less than 2·00 microns and more than 1·50 microns in length.

Type A and Type B were considered as medium and Type C as small chromosomes. There were 12 pairs of medium and 17 pairs of small chromosomes. Among the medium chromosomes one pair of metacentric and eleven pairs of submetacentric were seen. There were four pairs of metacentric and thirteen pairs of submetacentric among small chromosmes and

TABLE I

Pairs*	Length in microns		Total length in microns	Type
	Long arm	Short arm		
I (1)	2·07	1·18	3·25	A (SM)
II (1)	1·76	1·18	2·94	A (SM)
III (1)	1·76	1·02	2·78	A (SM)
IV (1)	1·47	1·18	2·65	A (SM)
V (1)	1·18	1·18	2·36	B (M)
VI (1)	1·18	1·02	2·20	B (SM)
VII (2)	1·32	0·88	2·20	B (SM)
VIII (4)	1·18	0·88	2·06	B (SM)
IX (4)	1·02	0·88	1·90	C (SM)
X (4)	0·88	0·88	1·76	C (M)
XI (4)	1·02	0·74	1·76	C (SM)
XII (5)	0·88	0·74	1·62	C (SM)

* Figures in brackets in the first column represent number of similar pairs in each group.