described earlier[2]. The animals were individually caged and maintained on standard laboratory diet[3] and water *ad lib* until experimentation. Three infected animals were sacrificed at a time on 2, 5, 13, 21, 28, 35, 50 and 60 days of postinfection along with controls side by side. Blood and muscle tissues were collected for PHI[4] and aldolase[5] estimation.

PHI and aldolase activities of serum and muscle tissue of infected host at different periods of postinfection and those for the corresponding controls are shown in table 1. It is evident from the present results that at the early stage of postinfection both the PHI and aldolase activities of serum and muscle tissue remained unchanged which may be explained on the ground that at this stage invasion of parasitic larvae into the muscle did not occur. At the later days of postinfection a large number of growing parasites settled into the sketal muscle and probably myofibrils are dearranged[6]. It seems likely that due to this, permeability of muscle cell membranes are increased as a result of which the intracellular enzymes are being released. So the concentration of these enzymes increases not only in the muscle tissue but also on the serum level. Increased enzyme levels in the muscle tissue may be due to enhanced aerobic glycolysis for the metabolism of carbohydrates through Embden-Myerhoff pathway by the nematodes. There is almost a linear correlation between the days of postinfection and enzyme concentrations. This may be due to increased number of parasites in the muscle tissue with the days of postinfection.

We finally conclude from the present work that the measurement of PHI and aldolase activities at different periods of trichinella infection are also of considerable significance for the diagnosis of severity in trichinosis, which is yet to be studied.

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INHIBITION OF GROWTH AND TOXIN PRODUCTION BY LAURIC ACID DERIVATIVES IN *ASPERGILLUS* SPECIES

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SEVERAL approaches[1-3] have been suggested to protect foods and feeds from mold growth and toxin production. One of them is to preserve the food materials with food-grade chemicals which appear to be safe because of their non-toxic nature to the consumer. Reports are available showing the inhibition of growth and toxin production by some fatty acid derivatives[4], antioxidants[5] and certain natural substances; like lauricidin (a monoglyceride of lauric acid) and butylated hydroxy anisole.

The monolaurin derivatives of lauric acid *viz* lauricidin-012, lauricidin-812 and lauricidin-1012 are considered as generally recognised as safe (GRAS) chemicals. The efficacy of these compounds as antifungal agents and toxin inhibitors is not known. Their efficacy as antifungal agents was therefore studied with special reference to three toxigenic *Aspergillus* species of *A. flavus*, *A. ochraceus* and *A. versicolor* (isolated from maize) which produced alfatoxin, ochratoxin and sterigamatocystin, respectively[6]. These were grown on sterilized chemically defined media[7-9], maize grain and maize flour, the latter two usually found naturally contaminated with these fungi and toxins.

Each test compound was incorporated at various concentrations in the above growth substrates and were inoculated with 1 ml of spore suspension of the test organism containing 10^5 spores. These were incubated for 8, 10 and 14 days, at which optimal growth and toxin were recorded for *A. flavus*, *A. ochraceus* and *A. versicolor* respectively. After the incubation period, dry weights of the mycelial mats were taken by separating the mycelial growth from the liquid phase and drying them at 100°C for 24 hr. Fungal growth on the two solid substrates (maize and its flour) was estimated biochemically by assaying the

Table 1 *Effect of lauricidin-012, lauricidin-812 and lauricidin-1012 on growth and toxin production by Aspergillus species*

Compound	Conc. (ppm)	Growth substrate	*A. flavus* Growth (mg)	*A. flavus* Aflatoxin B_1 (μg)	*A. ochraceus* Growth (mg)	*A. ochraceus* Ochratoxin A (μg)	*A. versicolor* Growth (mg)	*A. versicolor* Sterigmatocystin (mg)
Control	0	Liquid medium (LM)	2519±93	208.6±6.5	2394±13	114.5±2.2	2119±29	197.7±3.0
		Maize (M)	55.5±0.5	42.2±1.6	56.8±1.0	46.8±1.5	89.0±1.0	53.5±1.5
		Maize flour (MF)	66.0±0.7	50.5±0.2	60.5±2.0	48.0±1.2	118.5±1.0	67.5±0.2
Lauricidin-012	250	LM	604±18	Traces	497±52	Traces	206±36	0
		M	36.9±1.0	26.5±4.5	42.5±1.0	20.5±1.0	62.0±0.5	24.0±1.5
		MF	68.0±0.2	54.5±0.5	62.5±0.2	44.0±0.5	120.0±0.6	70.0±2.0
	500	LM	0	0	0	0	0	0
		M	23.5±1.0	Traces	21.5±0.4	0	32.5±1.5	0
		MF	47.0±0.8	32.5±1.6	44.0±0.4	Traces	83.5±0.5	32.0±0.2
	1000	LM and M	0	0	0	0	0	0
		MF	28.0±0.5	0	21.0±0.5	0	2.5±0.0	0
	2000	LM, M and MF	0	0	0	0	0	0
Lauricidin-812	500	LM	139±26	Traces	818±11	26.1±1.0	0	0
		M	45.5±1.0	33.5±2.0	40.0±1.0	20.6±0.5	56.3±1.0	ND
		MF	39.0±0.6	22.5±1.6	67.5±0.4	48.5±0.5	98.0±1.0	32.0±1.5
	1000	LM	0	0	92.0±0	0	0	0
		M	26.5±1.0	0	22.0±0.5	0	34.0±0	0
		MF	39.0±0.0	22.5±0.5	52.0±0.5	30.0±1.0	60.0±1.0	0
	2000	LM and M	0	0	0	0	0	0
		MF	32.0±1.5	0	33.0±1.0	0	12.0±0	0
	3000	LM and M	0	0	0	0	0	0
		MF	9.0±0	0	13.0±0	0	0	0
	4000	LM, M and MF	0	0	0	0	0	0
Lauricidin-1012	500	LM	366±48	Traces	521±40	Traces	191±16	0
		M	30.0±1.0	Traces	25.0±0.5	11.0±0.0	65.0±2.0	30.0±1.0
		MF	94.0±1.0	27.50±0.4	50.0±1.6	36.0±1.0	98.4±1.5	32.5±1.5
	1000	LM	0	0	0	0	0	0
		M	15.0±0.5	0	7.5±0.0	0	40.0±1.0	Traces
		MF	27.0±0.5	Traces	34.0±3.0	Traces	51.0±1.8	Traces
	2000	LM and M	0	0	0	0	0	0
		MF	19.0±0.5	0	16.0±0.0	0	22.0±1.0	0
	3000	LM, M and MF	0	0	0	0	0	0

Note: One 100 ml of liquid medium and 50 g of maize and flour each were used in all the experiments. The above values represent the mean of six experiments with standard deviation (±).

amount of glucosamine by employing known methods[10]. Toxin was estimated[11, 12] by the method of TLC using known toxin standards.

The results showed that lauricidin-012, lauricidin-812 and lauricidin-1012 were effective inhibitors of fungal growth and toxin production by the three *Aspergilli*, when grown on the three different growth substrates as shown in table 1.

It may be noted that higher concentration of each test compound was required for inhibition of both growth and toxin production when the three test fungi were grown on maize flour than on maize grain and liquid medium. Further 100% toxin production was inhibited by all the three compounds at lesser concentrations than required for growth inhibition. Similar results were reported[4] in the case of biosynthesis of alfatoxin on liquid medium by sorbic acid and derivatives of fatty acids.

Among the three lauric acid derivatives lauricidin-012 was more effective in inhibiting the growth and toxin production by the three test fungi (table 1).

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CHEMOTAXONOMY OF *CAESALPINIA*

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THE present note deals with the distribution of different chemical compounds in ten species of *Caesalpinia* and their identification and affinities on the basis of the same.

Standard phytochemical tests on *Caesalpinia bonducella* Flem., *C. cacalaco* Humb., *C. coriaria* Willd., *C. digyna* Rottl., *C. ferrae* Mart., *C. gledetschioides* Hook., *C. pulcherrima* Swartz., (Red and yellow flowers), *C. sappan* Linn., *C. sepiaria* Roxb., and *C. tortuosa* Roxb., have been carried out both with the fresh material and 80% ethanolic extracts to find out the presence of various chemical constituents in them.

Uniformly negative results are obtained for alkaloids, cyanogenic glycosides (HCN test A), indoles, lignans and saponins and uniformly positive results for simple phenols, similar flavonoids (Shinoda test), syringyl radicals (Maule test), and triterpenoids/steroids (Liebermann Burchard test). However, the

1. Juglone present	*C. sappan*
1. Juglone absent:	
2. Aucubin compounds present	*C. coriaria*
2. Aucubin compounds absent	
3. Catechol tannins present:	
4. Methylene dioxy compounds present	*C. pulcherrima* (red)
4. Methylene dioxy compounds absent	*C. pulcherrima* (yellow)
3. Catechol tannins absent:	
5. Leucoanthocyanins present:	
6. Anthraquinones present	*C. gledetschioides*
6. Anthraquinones absent:	
7. Tannins present	*C. cacalace*
7. Tannins absent	*C. sepiaria*
5. Leucoanthocyanins absent	
8. Syringaldehyde doubtful	*C. bonducella*
8. Syringaldehyde absent:	
9. Steroids present	*C. digyna*
9. Steroids absent:	
10. Tannins present	*C. ferrae*
10. Tannins absent	*C. tortuosa*