were also found to be different from that of pure crystals.

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## A STUDY OF SOME TOXIC CONSTITUENTS OF FIVE NEW VARIETIES OF PIGEON PEA (*CAJANUS CAJAN* (L) MILL SP.)

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LEGUMES are generally associated with cyanogenetic glycosides, tannins, trypsin inhibitors, phytohemagglutinins, goitrogens (in soybean and pea nuts), estrogens (in soybean), mimosene, a toxic amino acid (in *Leucaena glauca*); djenkolic acid (in *Pithecolobium lobatum*); and dihydroxyphenylalanine (in Indian variety of *Mucuna* seeds)[1]. In kidney bean[2] and in soybean, an antivitamin E factor has been reported. The toxic principles associated with pigeon pea are generally cyanogenetic glycosides[3], and trypsin inhibitors[4-6]. Since the toxic principles of the pigeon pea varieties under study are not known, attempts have been made to study the cyanogenetic glycosides, tannins and phytohemagglutinins.

All the five varieties of pigeon pea (*Cajanus cajan* variety T-21, JA-9-19, JA-3, Gwl-3 and JA-15) were procured from Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, India.

Cyanide and tannin content of the seeds were determined by the method of AOAc[7,8] whereas the method of Liener[9] was employed for phytohemagglutinins. The effect of phytohemagglutinins was studied in the blood of rabbit, goat and sheep.

The cyanide content of the seeds varied from 0.45 to 0.70 mg HCN/100 g seed, which was found to be in general agreement with most of the legumes[3,10] Var. JA-3 had the highest cyanide content (0.70 mg HCN/100 g seed) whereas Var. JA-15 had the lowest (0.45 mg HCN/100 g seed) (table 1).

TABLE 1

*Toxic constituents in Pigeon pea*

| Variety | Cyanide content mg HCN/100 g Seeds | Tannin content g/100 g Seeds |
|---|---|---|
| T-21 | 0.56 | — |
| JA-9-19 | 0.54 | 0.67 |
| JA-3 | 0.70 | 0.67 |
| Gwl-3 | 0.54 | 1.26 |
| JA-15 | 0.45 | 0.33 |

No hemagglutinin was found in these samples. The values are average of three independent determinations.

The tannin content of the seeds ranged from 0.33 to 1.26%, falling in line with other legumes[10]. It was highest in Var. Gwl-3 (1.26%), and lowest in Var. JA-15 (0.33%) (table 1).

Honovar *et al.*[4] failed to obtain agglutinating effect of pigeon pea seeds on the blood of rat. In the present investigation also agglutinating effect was studied on the blood of rabbit, goat and sheep but no positive effects were observed.

From the perusal of the data it appears that the percentage of different toxic principles in the five varieties of pigeon pea under study was comparatively[11,12] small (fatal dose recorded for hydrocyanic acid[11] is 50 mg/kg and fatal dose for tannic acid[12] is 6000 mg/kg).

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## THIOUREA DERIVATIVES AS ANTI-TUBERCULAR COMPOUNDS


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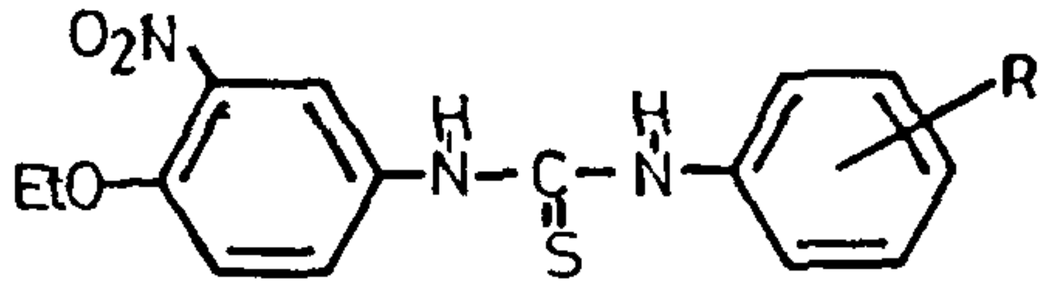
A NUMBER of thiourea derivatives have been synthesised since many of them have been reported[1-4] to possess anti-tubercular properties. In view of this observation, we report here some new compounds which have shown good anti-tubercular activity in the preliminary screening tests carried out at the Haffkine Institute, Bombay.

The compounds were obtained in 60–65% yields by the general method known in literature[5] involving the condensation of different amino compounds[6-9] with substituted phenyl isothiocyanates in boiling alcohol, acetone or toulene. All the compounds were crystallised from alcohol or D.M.F./methanol and were tested *in vitro* using Youman's liquid medium[10] against $H_{37}$ Rv strain of mycobacterium tuberculosis var hominis. By the same method, INH showed activity of 0.04 mcg/ml and streptomycin, 1.0 mcg/ml.

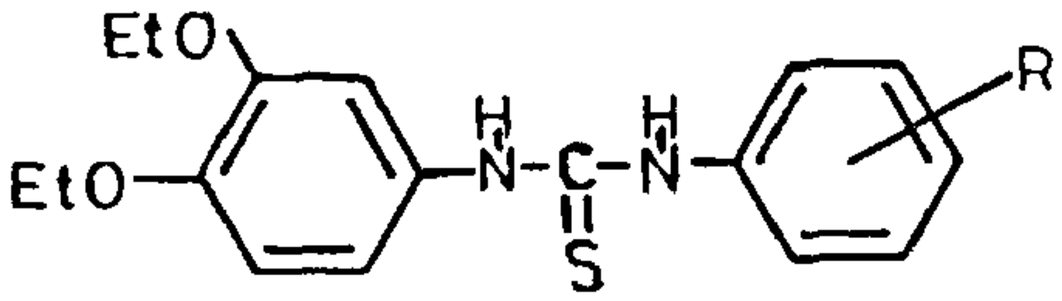
A typical thiourea (XII) showed in IR (KBr) spectrum bands at 3150 (—NH), 1530 (aromatic), 1475 (> C=S) $cm^{-1}$.

TABLE 1



| Sr. No. | R | m.p. °C | Minimum inhibitory concentration mcg/ml |
|---|---|---|---|
| I | H | 180–182 | 0.5 |
| II | *p*-Cl | 137 | 0.2 |
| III | *o*-Cl | 187 | 0.2 |
| IV | *m*-Cl | 179 | 0.5 |
| V | *p*-$CH_3$ | 160 | 0.2 |
| VI | *o*-$CH_3$ | 155 | 0.2 |
| VII | *m*-$CH_3$ | 163 | 0.2 |
| VIII | *o*-$OCH_3$ | 178 | 0.5 |
| IX | *p*-$OCH_3$ | 143 | 0.2 |
| X | *p*-$OC_2H_5$ | 140 | 0.1 |
| XI | *p*-*n*-$OC_3H_7$ | 147 | 0.1 |
| XII | *p*-*n*-$OC_4H_9$ | 156 | 0.1 |
| XIII | *p*-*n*-$OC_5H_{11}$ | 157 | 0.2 |
| XIV | *p*-iso-$OC_5H_{11}$ | 170 | 0.5 |

TABLE 2



| Sr. No. | R | m.p. °C | Minimum inhibitory concentration mcg/ml |
|---|---|---|---|
| XV | H | 150 | 40 |
| XVI | *o*-Cl | 170 | 20 |
| XVII | *p*-Cl | 120 | 20 |
| XVIII | *o*-$CH_3$ | 172 | 5 |
| XIX | *p*-$CH_3$ | 137 | 40 |
| XX | *p*-$OCH_3$ | 180 | 5 |
| XXI | *p*-$OC_2H_5$ | 215 | 0.5 |
| XXII | *p*-*n*-$OC_4H$ | 194 | 0.5 |
| XXIII | *p*-*n*-$OC_4H_9$ | 148 | 0.5 |
| XXIV | *p*-*n*-$OC_5H_{11}$ | 143 | 0.5 |
| XXV | *p*-iso-$OC_5H_{11}$ | 155 | 10 |