



Figure 1. Low energy singles gamma ray spectrum in the decay of Ba-133 recorded with a Si(Li) x-ray detector.

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its early stages. Recently a severe leaf blight was observed causing defoliation and premature death of the plants.

The initial symptoms of the disease were observed as a brown discoloration at the tip of mature leaves mostly 30–50 days after transplanting. Brown discoloration advanced towards the leaf margin. Gradually the leaf lamina presented a blighted appearance. The disease was severe during the summer months. Isolations made from the infected leaves on potato dextrose agar (PDA) yielded a fungal pathogen. The fungus was identified as *Alternaria alternata* (Fr) Keissler. The pure culture was deposited with CMI who have also confirmed the identity of the fungus (IMI No. 260358).

Pathogenicity tests of the fungus were conducted by spraying spore suspension and mycelial fragments on 40-day-old potted plants. The experimental plants were provided with high humidity for 48 hr after inoculation. Control plants were sprayed with sterile water. Initial blight symptoms appeared 8 days after inoculation followed by shedding of leaves within 15–20 days. The fungus was reisolated from the infected test plants.

Seven fungicides viz Benomyl, Carbendazim, Captan, Cuprasol, Dithane M-45, Dithane Z-78 and

ALTERNARIA BLIGHT: A NEW DISEASE OF PATCHOULI

T. N. PARAMESWARAN,
N. S. RAVINDRA and M. SARWAR

Central Institute of Medicinal and Aromatic Plants,
Regional Centre, Bangalore 560 037, India.

POGOSTEMON CABLIN Benth. (syn. *Pogostemon patchouli* var. *suavis* Hook.) is the source of well-known patchouli oil used extensively in perfumery. The oil is being imported to the tune of Rs. 50 lakhs every year. The cultivation of patchouli in India is in

Ferbam were screened against the organism *in vitro*. Poisoned food technique was used with PDA medium. Three doses were tried for each fungicide: (i) dose recommended for field application, (ii) half of the first dose, and (iii) twice the first dose. Radial growth of mycelium was recorded starting from 96 hr of inoculation up to 192 hr. Percentage of growth inhibition was calculated. Benomyl and Bavistin did not significantly inhibit growth of *Alternaria alternata*. Only Ferbam, Dithane M-45 and Captan inhibited the growth of the pathogen by > 50%. Field experiments need to be conducted to determine the effectiveness of these fungicides (Ferbam, Dithane M-45 and Captan).

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STEREOSPECIFIC SYNTHESIS OF OPTICALLY ACTIVE *CIS*-3(R)-(3',3'-DIHALO-2'-PROPENYL)-2,2-DIMETHYL-1(S)-HYDROXYMETHYL CYCLOPROPANES AND THE CORRESPONDING CYCLOPROPANE-1-CARBOXYLIC ACIDS FROM (+)-3-CARENE

G. S. JOSHI, R. H. NAIK and G. H. KULKARNI
National Chemical Laboratory, Pune 411 008, India.

A number of compounds derived from cyclopropyl methanol/cyclopropane carboxylic acids lacking an asymmetric centre are known to exhibit miticidal activity¹⁻³. Staal *et al*² attributed the mite ovicidal activity of such compounds to the cyclopropyl methyl moiety. Recently some optically active esters derived from 2,2-dimethyl 3-*n*-propyl cyclopropyl ethanol⁴ and cyclopropane acetic acids⁵ exhibited miticidal activity against tuber, potato and red spider mites as well as pink and purple mites (adult stage) of tea plantations at dosage levels of 0.0001-1% with 100% mortality. In addition, esters of 2,2-dimethyl 3-alkyl cyclopropane carboxylic acids, optically active^{6,7} as well as inactive *dl cis* and *trans* isomers⁸ are reported to possess insecticidal activity. With a view to studying the effect of a halogen containing unsaturated alkyl side chain at C₃, in place of the normal saturated alkyl side chain, we now report the synthesis of alcohol moieties (VIII and XIII) as also the corresponding acid moieties (IX and XIV) from (+) 3-carene*. These compounds have been prepared with a view to examining some of the esters prepared from alcohol and

acid moieties for evaluating them for miticidal and possible insecticidal and larvicidal activities.

The acetate aldehyde⁹ (III), on Wittig reaction using 1,1-dibromomethylene triphenyl phosphorane¹⁰ gave the dibromo acetate (VII), ^{**}C₁₁H₁₆O₂Br₂, M⁺ 338 (⁷⁹Br), 340, 342 (⁸¹Br), [α]_D²⁸ + 4.6° (C, 2.0, CHCl₃), b.p. 184° (bath)/5 mm; with the following data:

^{***}IR bands at: 1736 (C=O), 1242 (-OAc), 1630, 790 (HC=C<); PMR (CDCl₃): Signals at: 0.55 to 0.84 (2H, *m*, C₁ and C₃ cyclopropane protons), 0.97, 1.03 (3H each, *s* each, *gem*-dimethyl), 2.01 (5H, *s*, overlapping multiplet, acetate methyl and -CH₂ at C₃), 4.04 (2H, *t*, J=6.4 Hz, methylene protons of -CH₂OAc) and 6.36 (1H, *t*, J=6 Hz, olefinic proton).

Alternatively, compound (II) was treated with tribromomethyl carbanion¹¹ (CHBr₃/K⁺tBu⁻ at -20°) to afford as a major product (IV, 35%), C₁₁H₁₇O₂Br₃, M⁺ 418 (⁷⁹Br), 421, 424 (⁸¹Br), [α]_D²⁷ - 15.4° (C, 1.96, CHCl₃); with the following spectral data: IR bands at: 3400 (-OH), and 1710 (>C=O); PMR (CCl₄) signals at: 0.76-0.9 (2H, *m*, C₁ and C₃ cyclopropane protons), 0.96, 1.13 (3H each, *s* each, *gem*-dimethyl), 1.76 (2H, *m*, -CH₂ at C₃), 2.13 (3H, *s*, -COCH₃), 2.43 (2H, *d*, J=7 Hz, -COCH₂), and 3.83 (2H, *m* -C₂-H and -OH proton). The other products were not characterized further.

Acetylation (Ac₂O/pyridine) of (IV) gave the acetate (V) as a mixture of diastereomers; C₁₃H₁₉O₃Br₃, M⁺ 460 (⁷⁹Br), 463, 466 (⁸¹Br), [α]_D²⁷ - 5.8° (C, 2.0, CHCl₃); IR: 1750, 1215 (-OCOCH₃), 1710 (>C=O); PMR (CDCl₃): 0.62-0.72 (2H, *m*, C₁ and C₃ cyclopropane protons), 0.88, 0.96, 1.0 (6H, *s* each, *gem*-dimethyls of both diastereomers), 1.86 (2H, *m*, -CH₂ at C₃), 2.12, 2.16 (3H each, *s* each, acetate methyls of both diastereomers), 2.40 (2H, *d*, J=6 Hz, methylene adjacent to C=O) and 5.52 (1H, *m*, -C₂ proton of both diastereomers).

Bayer-Villiger oxidation (PBA) of V afforded a mixture of diastereomers of (VI), C₁₃H₁₉O₄Br₃, M⁺ 476 (⁷⁹Br), 479, 482 (⁸¹Br), [α]_D²⁹ + 10.1° (C,

* Optical purity of (+) 3-carene used in the reactions is more than 98%.

** Satisfactory elemental analysis have been obtained for all the compounds reported.

*** IR bands expressed in ν(cm⁻¹) and PMR chemical shifts in δ(ppm) scale with TMS as internal standard.

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