

Protocol Evaluation for the Analysis of Pesticides Residues in Cumin (*Cuminum cymium* L.)

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Abstract—Cumin (*Cuminum cymium* L.) commonly named as jeera is a prominent seed spice crop cultivated in the arid regions of Rajasthan during winter with a good export potential. The crop faces severe management issues from fungal diseases such as wilt, blight, powdery mildew, damping off and insect infestation by aphids and thrips in moderate to severe form. A broad array of fungicides and insecticides are used to control these diseases. Seed samples of cumin were collected from farmer's field and local markets in Ajmer, Nagaur, Barmer, Jalore, Jodhpur, Jaisalmer and Pali, districts of Rajasthan for the analysis of pesticides residues in cumin seeds. A simple, reliable and robust multi residue protocol for the analysis of fungicides and insecticides in cumin has been standardised in collaboration with NRC on grapes, Pune and distribution of these commonly used fungicides were qualitatively and quantitatively determined in the collected samples. Instrumental parameters were standardized for proper resolution and sensitivity. Extraction of pesticides was carried out from the water extract with acetonitrile, MgSO₄ and NaCl and clean up with PSA, MgSO₄, acetic acid and C18. The analytes were analysed on Thermo TSQ 8000 Evo GC-MS Chromatograph. The residues of some fungicides detected (difenacozole, flusilazole, hexaconazole, propiconazole, pyraclostrobin and tebuconazole) in the samples varied from 0.01 to 0.13 mg/kg and were within the safe limit as per EU, MRL except for propiconazole being at par, the MRLs for these residues are not defined in India.

Keywords: *Cuminum cyminum*, Multiresidue Methodology, Fungicides, Clean up, Wilt, Blight, Powdery mildew.