**Project Title:** Management of corm rot and wilt of gladiolus by combining chemical and non-chemical approaches

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**Objective**

1. To record prevalence of Fusarium yellows of gladiolus in field and storage and to ascertain the variability among the isolates of pathogen, if any.  
2. To study the role of critical environmental factors for the development and spread of the disease both under field and storage  
3. To work out an effective strategy for the management of the disease through chemical means.

**Summary**

Wilt and corm rot incidence of gladiolus was found more in Solan district followed by Sirmour, Mandi, Kangra and Kullu. Whereas Shimla district recorded less disease incidence during survey conducted in years 2003-04. The wilt incidence ranged from 68.29 to 79.28% while corm rot incidence was found 34.28 to 35.00%. Variability studies of fourteen different isolates of the wilt pathogen (*F.o.f.sp. gladioli*) isolated from different flower growing areas of H.P. revealed difference in their pathogenicity. Morphologically and symptomatically less variation was observed. In general morphologically the mycelium of different isolates was white or peach or off white in colour, usually with a purple tinge, sparse to abundant than flocculate and wrinkled in older cultures. Microconidia on phialides arising laterally from hyphae or short conidiophores were aseptate. Macro- conidia were sparse in some strains and were borne on more elaborately branched conidiophores, thin walled, generally 3-5 septate, fusoid or pointed at the ends. While chlamydospores were smooth, rough walled terminal or intercalary and occasionally found in chains. However, the isolates of cooler region comparatively were found less virulent than warmer regions. Physical factors such as soil temperature (27-33°C), soil pH (6.5), soil moisture (60%) and soil type (loam to sandy loam structure) played important role in rapid spread of wilt infection. An excellent reduction of wilt disease was recorded in biologically treated corms with *Trichoderma harzianum*, *T. viride* and *T. virens* in slurry dip and as placement methods under field conditions where in placement method, the biocontrol agent inoculum was applied @ 20 g below the corm base at the time of sowing of the corms. Different phytoextracts were reported to inhibit the mycelial growth. Plant extract of *Aloe barbedensis* followed by *Ocimum sanctum* gave maximum percentage of mycelial inhibition. This was followed by *Cannabis sativus* and *Adhattoda visaca* that gave next best inhibition in mycelial growth thus can be exploited for control of wilt. Fungicides like Bavistin (0.1%), Saaf (0.25%) and Bavistin + Dithane M-45 (0.25%) in combinations recorded less corm rot phase under different storage conditions i.e zero, laboratory and refrigerated conditions. In vitro evaluation of fungicides against biocontrol agents (*T.harzianum* and *T. viride*) for compatible reaction for incorporating in IDM practices was carried out. It was observed from the results that out of five
systemic fungicides, three Bavistin, saaf (carbendazim + mancozeb) and triadimefon (bayleton) were found compatible with *T. harzianum* and *T. viride* except kri-benomyl and topsin-M at 50, 100, 250 and 500 ppm concentrations. Similarly in case of non-systemic fungicides, captan, Dithane M-45, kavach and thiram tested @ 500, 750, 1000 and 1500 ppm concentrations were observed highly compatible with biocontrol agents while difolatan and Blitox-50 found to have inhibitory action. Thus Bavistin, saaf, DithaneM-45, triadimefon, captan, thiram and kavach were found compatible with biocontrol agents (*T. harzianum, T. viride*) and can be tried in IDM programme. Three new fungicides (Quintal @ 0.25%), (Hilnate @ 0.1%) and Contaf (0.04%) gave good results with regards to disease suppression if applied as dip or soil drench treatment. Hot water treatment along with Bavistin (0.1%) and captan (0.2%) was recommended to corms at 56°C for 20 mm. Neem cake application in soil alone and in combination with *T. harzianum* and *T. viride* reduced the wilt infection in field and under protected conditions. Soil solarization for nearly 2 months if practiced individually and in combinations with neem cake amended soils and antagonists treated corms resulted in minimizing the wilt incidence. Treatments like soil solarization (SS)+ neem cake (NC) + cotton cake (CC) and SS+ *T. harzianum*+ *T. viride* were reported effective in increasing the percent disease control of Fusarium wilt of gladiolus. Fungal antagonists compared to bacterial antagonists were found superior against wilt pathogen of gladiolus. The combination of *T. viride* + *T. harzianum* + *Pseudomonas fluorescens* and *Pseudomonas fluorescens* + *T. harzianum* gave minimum disease incidence compared to individual effects.