plants were used, pseudothecia developed on the tissue inoculated with mixtures of some isolates, but not on tissue inoculated with single ascosporic isolates or other mixtures of isolates, suggesting that the fungus is heterothallic.

Pseudothecial development on debris on moist paper towels indicated that nutrients, apart from those supplied by the stems or pods, were not essential for teleomorph development. Attempts to produce pseudothecia on artificial media (natural PDA, Difco PDA, chickpea extract agar, chickpea extract-malt extract agar, and chickpea extract-diluted PDA), or on sterilized chickpea debris on field soils, perlite, or water agar, in petri dishes were unsuccessful.

Under field conditions, in the Palouse region of eastern Washington and northern Idaho, USA, pseudothecia developed in large number on debris of infected stems and pods placed on the soil surface after harvest. Although a few pseudothecia matured by mid-December, 2 months after placement in the field, most of the ascospores were sufficiently mature for discharge in April, coinciding with the vegetative stage of chickpeas. At this time, maximum ascospore discharge was about 1000 ascospores mm^{-2} of highly infested tissue. Within 1-1.5 months, there was a drastic decrease in ascospore release. Complete exhaustion of the ascospore supply occurred in October 1986 for debris incubated since 1985, and June 1987 for debris incubated since 1986. Pycnidia also formed on the chickpea debris, but most were empty by the end of the current growing season. When infested debris was buried, the fungus lost its viability in about 2-3 months.

Farmers in the Palouse region are being encouraged to adopt minimum tillage practices, in order to conserve moisture and reduce soil erosion. Reduced cultivation leaves most infested chickpea debris on the soil surface, favoring development of pseudothecia of *M. rabiei* during winter. Airborne ascospores apparently were the primary inoculum for ascochyta blight epidemics in 1986 and 1987, where clean seed was planted and some of the affected fields were located in areas where chickpeas had never been grown. No indigenous source of the fungus or other hosts are known in this region.

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Tribulus terrestris L.--A Potential Reservoir of Chickpea Stunt Virus

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Stunt disease is known to cause substantial crop losses to chickpea in several countries (Nene and Reddy 1976). The disease occurs at high incidence in northern India. The causal agent appears to be bean leaf roll virus (BLRV) and *Aphis craccivora* Koch has been shown to be a major vector of the disease under field conditions (Nene and Reddy 1976; Nene 1980).

Epidemiology of chickpea stunt has not extensively been studied. The role of off-season reservoirs of the virus and the vector in perpetuating the disease is not known. Earlier studies at Hisar, in northern India, indicated the relationship between the trap catches of *A. craccivora*, (especially in December), and the incidence of stunt (Sithanantham et al. 1984). Several plants in and around Hisar have been shown to act as hosts of *A. craccivora* (Verma et al. 1975).

During 1986/87 crop season, a survey was made to identify the hosts of *A. craccivora*. A commonly occurring perennial weed, *Tribulus terrestris* (Family: Zygophyllaceae), known locally as *Bhakdi*, was found to be extensively colonized by *A. craccivora* from November 1986 through February 1987. Alatae and apterous forms of *A. craccivora* were collected from *T. terrestris* and transferred on to chickpea plants (cv WR 315) and allowed on inoculation access period of 3-4 days. Later the aphids were killed by spraying with dimethoate (0.3%) and the test plants were observed for stunt symptoms for 2 months. Seven of 10 exposed plants showed symptoms typical of stunt, while all 10 noninoculated plants remained symptom-free. These preliminary studies showed that the weed, *T. terrestris*, may serve as a reservoir of BLRV and as an off-season host for *A. craccivora*. Further studies are being carried out to determine the role of this weed in the epidemiology of chickpea stunt.

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Occurrence of Perfect State of *Ascochyta rabiei* in Syria

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Mycosphaerella rabiei Kovachesvki, the perfect state of *Ascochyta rabiei* (Pass.) Lab., was first discovered on overwintered chickpea refuse in Bulgaria in 1936 (Kovachevski 1936) and was subsequently reported from USSR, (Gorlenko and Bushkova 1958) and Greece (Zachos et al. 1963). Recently, it has been also reported from Hungary (Kovics et al. 1986) and USA (Kaiser and Hanan 1987).

At Tel Hadya, ICARDA's principal research station in northern Syria, *M. rabiei* was discovered on the overwintered chickpea debris, particularly on stem pieces in a field where chickpea was grown during the 1985/86 season and severely infected with ascochyta blight. The field was plowed in summer (August 1986) and was sown with wheat in December. From November 1986 to February 1987, the temperatures were quite low ranging from -2°C to 15°C. From November 1986, chickpea host tissues lying on the soil surface were regularly collected and examined critically under stereobinoculars for the presence of perithecia of *M. rabiei*.

In early March 1987, perithecia were observed on overwintered chickpea debris. The perithecia were intermingled with empty pycnidial bodies embedded in plant tissues. They looked prominent when the shredded bark was removed from the stem. Several observations under stereobinocular confirmed the formation of perithecia, restricted to infected plant tissues.

Morphology. Perithecia were dark brown to black, globose with a perithecial beak, ostiolate, and measured 82-56 μm x 125-255 μm in size. Asci were cylindrical, clavate, curved, pedicellate, and 51-70 μm x 10-16 μm in size (Figs. 1 and 2). Ascus contained eight, hyaline, ovoid ascospores that were divided into two unequal cells constricted at the septum and measured 13-20 μm x 5.5-7.5 μm. Isolations from single perithecia yielded the cultures of *A. rabiei*, which were pathogenic to chickpea.

It seems that conditions in eastern Europe and western Asia are favorable to produce the perfect state of *A. rabiei*. Severe cold winter might be a prerequisite for the production of perithecia on infected tissues. This stage may be an important factor in the dissemination of inoculum in this region.

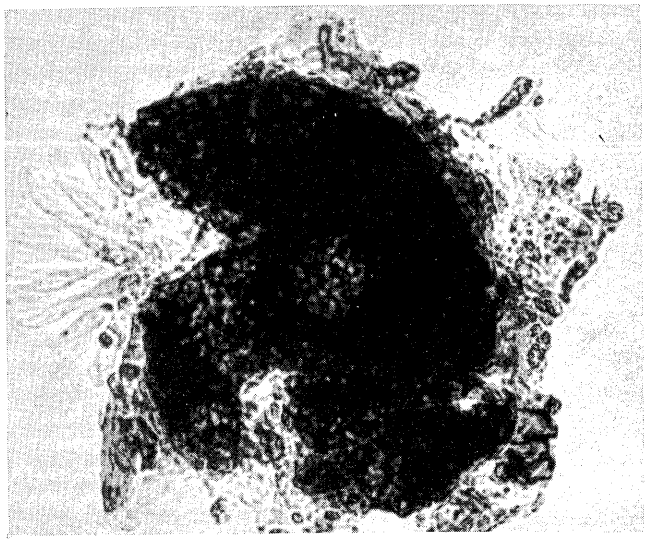

Figure 1. Perithecium of *Ascochyta rabiei*.

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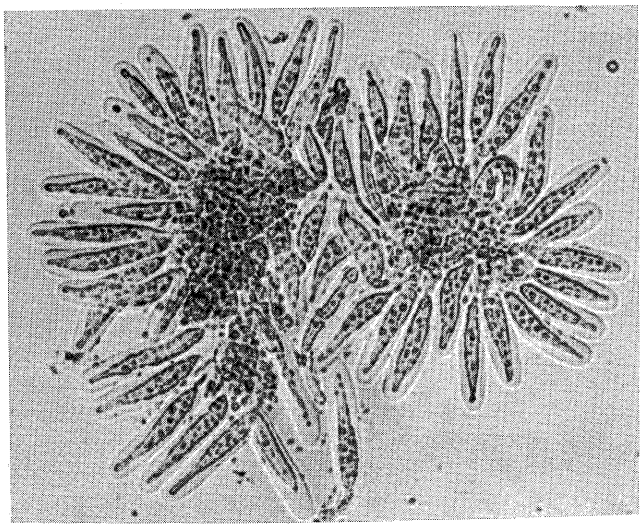

Figure 2. Asci of *Ascochyta rabiei*.