

SHORT NOTE

Occurrence of field dodder (*Cuscuta campestris* Yuncker) on onion fields in the Gezira Scheme

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Dodder (*Cuscuta spp*) is an annual obligate stem parasite that attaches itself to a variety of host plants. It produces dense and shady barriers or canopy which drastically reduce growth and vigor of the host. Significant crop losses have been reported due to infestation of pulses, sugar beet (*Beta vulgaris* L.) potato (*Solanum tuberosum* L.), alfalfa (*Medicago sativa* L.), tobacco (*Nicotiana tabacum* L.) and onion (*Allium cepa* L.). Pulses in general have been seriously infested while cereals have never been reported to be infested by the parasite irrespective of seasonal conditions (Dawson *et al.*, 1994). However, according to Mishra *et al.* (2007) the susceptibility of pulse crops to *Cuscuta* could vary with crop. Toth *et al.* (2006) reported that *C. campestris* infestation reduces sugar beet weight by 21.6-37.4 % and sugar content by 12.0-15.2 %. Beside sugar beet, field dodder infests onion. In Sudan, Bebawi and Neugebohrn (1991) reported dodder as a serious parasitic plant on lucerne, horse beans and water cress. Abdalla and Siddig (1993) showed that fruit yield of roselle (*Hibiscus sabdariffa* L.) could be considerably reduced as a result of infection by dodder (*Cuscuta hyaline* Roth). The present study was conducted to identify the dodder species that parasitizes onion in the Gezira scheme, estimate yield reduction in onion and to determine the natural host range of the parasite.

Field visits were made during the year 2009 to three commercial onion fields in Hamad el Neel and Wad el Nour in the Southern Block of the Gezira scheme. Dodder vine including reproductive parts were collected for taxonomical studies. Identification of the parasite was based on morphological characteristics such as stem size, colour and flower structure. The impact of dodder infestation on onion was studied during the year 2009 in one commercial onion field that was heavily infested with dodder. Three samples in 50× 50 cm quadrat consisted of about 14 onion plants were collected from infested plots. Three other samples of the same size were collected from a neighbouring uninfested onion plots from the same field to serve as control. Total fresh weight, bulb weight and bulb diameter were determined.

Cuscuta plants found in onion fields in the southern part of the Gezira scheme are slender thread-like vine. The stem colour is yellow or bright orange. Flowers are 2-3 mm long and sometimes longer, carried on short pedicels in compact clusters. Calyx lobes are oval broader than long. Corolla lobes broadly triangular, acute tips often inflexed about equaling the corolla tube. Stamens shorter than the lobes, filaments longer or equal to the oval anthers. Infrastaminal scales ovate and much fringed, styles slender shorter than or equaling the globose ovary. Stigma globose, (Photo. 1) capsule round, 1.5-3.0 mm in diameter. Based on the above mentioned characters the specimens of *Cuscuta* collected from onion fields in the Gezira scheme is almost similar to *Cuscuta campestris* described by Yuncker in 1932.

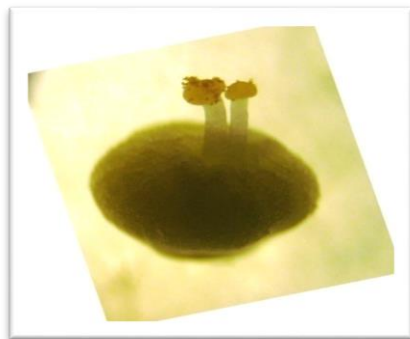


Photo. 1. Short styles, globose stigma and globose ovary of field dodder collected from the Gezira scheme.

Field investigations revealed that field dodder is widely distributed in cultivated onion in the Gezira scheme. In addition to observations in the southern part, recently onion growers noticed its presence in central Gezira (Altalha and Madina Arab) and in the northern Gezira (Hasahisa)(Agricultural Administration- Hasahisa–personal communication). *Cuscuta* fruits have papery walls and light weight when dry and are capable of floating on water. This can lead to long distance dissemination along water canals. Moreover, wind may also play an important role in the dispersal of these light weight fruits. In addition, *Cuscuta* seed size which is about equal to onion seed size and use of uncertified seeds produced in the farm may lead to contamination of onion seeds with dodder seeds. These factors may have contributed to increased *Cuscuta* population in onion fields of the Gezira scheme. These observations confirmed the findings of Austin (1980) who claimed that dodder seeds were introduced to Sri Lanka with rice seeds imported from China. Host plants recorded in the southern Gezira scheme included onion (*A. cepa*), (Photo. 2, A) chickpeas (*Cicer arietinum* L.), molokhia (*Corchorus olerarius* L.), (Photo. 2, B) hiemera (*Corchorus fascicularis* Lam.) and molieta (*Sonchus coronatus* Hochst. ex Obi+ Hirn.). However, *Cuscuta* spp. were known to parasitize many dicotyledonous host plants and few monocotyledonous plants. Jayasinghe *et al.*, 2004) reported that *Cuscuta* parasitizing 161 species belong to 59 families comprising 27 crops including onion. The same authors indicated that *Cuscuta* differentiates between primary and secondary hosts and considered grasses as secondary host of *Cuscuta*. Toth *et al.* (2006) reported that field dodder parasitized sugar beet, alfalfa, tobacco, potato, lentil, parsley and onion. In Sudan *Cuscuta hyalina* Roth. was found to infect faba bean (*Vicia faba* L.) and alfalfa (*Medicago sativa* L.) (Braun *et al.*, 1991) and roselle (Abdalla and Siddig, 1993). *Cuscuta campestris* was found on host plants including sugar beet, potato, tomato, onion and other vegetable crops but not grasses (Dawson *et al.*, 1994).

Results obtained from this study indicate that the plant growth and yield of onion were drastically affected by the parasite. The total fresh weight, bulb weight and bulb diameter were reduced by 62%, 75% and 40.6%, respectively (Table1). This reduction was accompanied by stunted growth and leaf die back of infected onion plants (Photo. 3) because the parasite produced a shady barrier which reduced the growth and vigor of the host. In Sudan, dodder (*Cuscuta hyalina*) was responsible for its devastating effect on alfalfa and faba bean (Braun *et al.*, 1991), and for its drastic effect on yield of roselle. Roselle number of leaves /plant and leaf fresh weight were reduced by

32% and 11%, respectively (Abdalla and Siddig, 1993). *Cuscuta campestris* infestation reduced weight and sugar content of sugar beet (*Beta vulgaris*) by 21.6-37.4 and 12-15.2 %, respectively (Toth *et al.*, 2006).



Photo. 2. Onion A, and Molokhia B, parasitized by field dodder.

Table 1. Effect of field dodder infestation on growth and yield of onion.

Character	Healthy	Infected	Reduction(%)
Total fresh weight (g)	1954.75	732.66	62.0
Bulb weight (g)	1093.50	274.30	75.0
Bulb diameter (cm)	4.95	2.94	40.6

To our knowledge this is the first report of dodder parasitizing onion in Sudan. Based on these preliminary findings, it is evident that *Cuscuta* is a potential hazard to crop production in Gezira scheme and elsewhere. Further future research should concentrate on determination of host range, damage caused on different crops and studies on biology and control of the parasite.

C



D



Photo. 3. Poor growth and reduced bulb size (C), accompanied with leaf die back (D), of onion plant due to infection by field dodder.

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انتشار الحامول الحقلي في حقول البصل بمشروع الجزيرة

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الخلاصة

لوحظ الحامول الحقلي لأول مرة متطفلاً على البصل بالقسم الجنوبي بمشروع الجزيرة في العام 2009. لإجراء هذه الدراسة تم اختيار ثلاثة حقول عالية الإصابة في منطقتي ود النور وحمد النيل في جنوب الجزيرة. هدفت هذه الدراسة إلى التعرف على نوع الحامول، تقييم تأثيره على إنتاجية البصل وتحديد المدى العائلي. أوضحت الدراسة المورفولوجية لسيقان وأزهار الطفيل أنه يشبه الحامول الحقلي (*Cuscuta campestris*). كما أوضحت الدراسة أن الإصابة بالحامول الحقلي أدت إلى خفض الوزن الرطب، وزن الأبصال، وقطر الأبصال بنسب 62%، 75%، و40.6% على التوالي. صاحب هذا النقص تقزم النباتات المصابة وموت تراجمي للأوراق. لوحظ أيضاً أن الحامول الحقلي بجانب البصل يصيب الملوخية، الحمص، الحميرة والموليتة. تشير نتائج الدراسة أن الحامول الحقلي خطر يهدد زراعة محصول البصل ومحاصيل أخرى. عليه يوصى بان تتركز الدراسات في المستقبل على تقييم تأثير الطفيل على المحاصيل الأخرى وتحديد المدى العائلي والطرق المثلى للتحكم في الطفيل.