



## **Determination of Root Lesion Nematodes (*Pratylenchus* spp.) on Dry Bean Growing Areas in Central Kızılırmak Valley**

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### **Abstract**

Dry bean contains high fiber, minerals, and vitamins as well as protein. Although it has an important place for human nutrition, dry bean production is gradually decreasing. Biotic and abiotic factors affect dry beans productions. One of the important biotic effects is plant-parasitic nematodes. Each year, plant-parasitic nematodes have been estimated caused damage of 80 billion dollars. Root lesion nematodes are important root parasitic nematodes especially cereal and legumes growing areas. The aim of this study was to determine root lesion nematodes in Central Kızılırmak Valley which is one of the important dry bean growing areas in Turkey. In this study, 144 soil and root samples were collected from dry bean fields of 8 cities. Soil and root samples were extracted by modified baermann funnel method (pedri dish method). The survey result showed that *Pratylenchus* species is widespread in all areas. Most common species was found in *Pratylenchus thornei* (Sher et Allen).

**Keywords:** Plant-parasitic nematodes, *Pratylenchus*, Dry beans,

### **INTRODUCTIONS**

Dry bean is one of the well-known legumes, along with peas, soybeans and lentils. They contain high fibre, minerals, and vitamins as well as protein. Although it has an important place for human nutrition, dry bean production is gradually decreasing in Turkey. In 2017, dry bean was cultivated in 897.221da, and production was recorded 239.000 tonnes [1]. Each year, Turkey has import to dry bean mainly from Canada, Kyrgyzstan and Argentina. There are many reasons for the decline, including, rising the costs of seed, petrol, fertilizer and pesticide, seed degeneration, an absence of research into seed improvement, more profitable competing crops, biotic and abiotic factors [2]. One of the important biotic factors is plant-parasitic nematodes. Each year, plant-parasitic nematodes have been estimated caused damage of 80 billion dollars on agricultural productions [3]. Plant parasitic nematodes can be suppressing on *Rhizobium* root nodulation and nitrogen-fixing activities by feeding them on root systems [4]. The genus of *Pratylenchus* is known as root-lesion nematodes, about 68 valid species are known in the world. *Pratylenchus* spp. is caused economically important damage on bananas, cereals, coffee, corn, legumes, peanut, potato, and vegetable and fruit trees [5]. *Pratylenchus* spp. symptoms of plants are the lesion on root systems, and chlorosis, stunting and low vigor above-ground part of plants. Root lesion nematodes can destroy plants cells and other pathogens are penetrated to root from there [6]. *Pratylenchus thornei*, *P.neglectus*, *P.fallax*, *P.crenatus* and *P.penetrans* are found in cereal and bean growing areas in Turkey [7, 8, 9, 10].

The aim of this study was to determine root lesion nematodes in Central Kızılırmak Valley which is one of the important dry bean growing areas in Turkey.

### **MATERIALS AND METHODS**

Totally 144 soil and root samples were collected from Aksaray, Ankara, Çankırı, Kayseri, Kırıkkale, Kırşehir, Nevşehir and Sivas during dry bean growing season in 2016 (Figure 1). Soil samples were taken to a depth up to 30 cm [11]. Soil and root samples were packaged and labelled separately. All samples were processed within 5 days of collection. Petri dish method (modified Baermann funnel method) was used for plant parasitic nematode extraction [11]. Plant parasitic nematodes were counted under light microscope at 100x magnification and identified. Their density was found on 100 g of soil. After recorded, nematodes were killed by heat at 65°C for 2 minute and fixed in TAF solution [12]. After the two days, nematode solution transferred to pedri dish to evaporate water. Solution I and Solution II were added respectively [13]. The nematodes were kept in pure glycerine and permanently mounted on glass slides using the wax-ring method [12]. *Pratylenchus* spp. were identified by morphological and morphometric characters [14, 5].

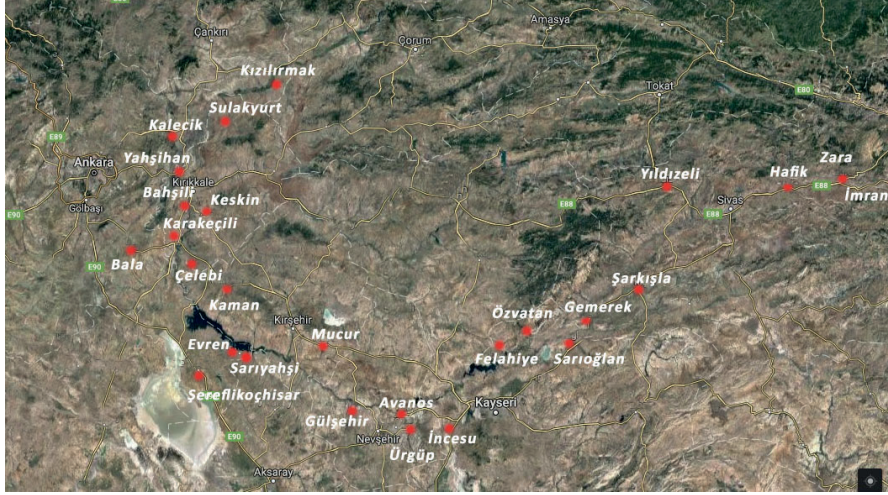


Figure 1. Sampling areas in Central Kızılırmak Valley [15]

## RESULTS

As a result of this study, 70.83 % of soil and root samples were found infected with *Pratylenchus* spp. *Pratylenchus thornei* was found the most widespread species and generally occurred alone, but have been found together with *P.thornei* and *Pratylenchus neglectus* some areas in Central Anatolia. 57.63 % of soil and root samples were found to be infected with *P. thornei*. 25% of samples were found to be infected with *P.neglectus*. The highest density of *P. thornei* population was found 20.44 nematode/g soil in Kayseri-Sarıoğlan. This was followed by 12.15 nematode/g soil in Sivas-Zara, 5.58 nematode/g soil Sivas Merkez, 4.88 nematode/g soil in Sivas Hafik and 4.12 nematode/g soil Sivas Yıldızeli. The highest density of *P.neglectus* population was found 3.90 nematode/g soil in Sivas –Zara.

## CONCLUSION

Legume is grown generally on the Anatolian Plateau, and these cultivars were rotated with cereals. Root lesion nematodes are important plant parasitic nematodes on cereals and legumes [16]. This survey was showed that dry beans growing fields were widely infected with *P.thornei* and some areas infected with *P.neglectus* in Central Kızılırmak Valley. [17] reported that *P. thornei* was common in fresh bean cultivation areas of Bilecik and it reproduced well on fresh bean cultivars. The highest reproduction was found to be 84.6% and highest yield loss was found 14.2% on Aşekadın fresh beans cultivar. In this study, Kayseri-Sarıoğlan province was found the most infected area (20.44 nematode/g soil), and totally 70.83% of soil and plant samples were found infected by *Pratylenchus* spp.

This result from survey indicates that *P.thornei* is likely to be of economic concern on bean growing areas. No resistance bean cultivars available so seed improvement programme is very important for controlling *Pratylenchus* spp. Furthermore, screening studies (laboratory and field experiments) should be carried out for resistance breeding programs.

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