



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2023; 12(8): 2041-2043  
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Received: 26-05-2023

Accepted: 29-06-2023

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## Critical period of crop-weed competition in pigeonpea under South Gujarat condition

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#### Abstract

At the Agriculture Research Station, an experiment was carried out in the field during the 2018 *kharif* season, Navsari Agricultural University, Mangrol to study critical period of crop-weed competition in pigeonpea under south Gujarat condition with 12 treatments. In the experimental site found the various types of monocot, dicot and sedges weeds. Treatment W<sub>4</sub> (Weed free up to 60 DAS) recorded the noticeably highest grain and stalk yield. Lowest grain as well as stalk yield was recorded with W<sub>12</sub> (Weedy up to harvest). All weedy treatments found more weed infestation so that they suppress the growth of crop. So that ultimately reduce yields of crop.

**Keywords:** Weed, pigeonpea, grain yield, weed flora, weed management

#### Introduction

The name Arhar is a popular one for pigeon pea. It is a significant and historical crop in our nation. It is grown in wide range of agro ecological situations because of its deep root system and due to this characteristics, it is drought tolerant and is useful in the areas of low and uncertain rainfall on lighter soils. It is grown as sole as well as mix or inter crop. Traditional long-duration pigeon pea types, which take between 240 and 270 days to mature, have limited potential, are prone to several illnesses and pests, and are also harmed by frost. Recently, some short-duration cultivars (120–125 days) with excellent yield potential (20–30 q/ha) and harvest by the end of November have been produced. These cultivars work particularly well with double cropping systems that include *rabi* crops in addition to wheat.

Pigeon pea is grown throughout tropical countries like Africa, West Indies, Shrilanka, Australia and Malasia. It occupies area of 3.9 million hectares area with the production of 3.3 MT having the productivity of 848 kg/ha. Gujarat, Maharashtra, Uttar Pradesh, Madhya Pradesh, Karnataka, and Andhra Pradesh are among the states that grow large quantities of the crop. About 40% of the nation's pigeon pea production comes from Uttar Pradesh alone. In Gujarat, it is grown in about 2.28 lakh/ha with the production of about 2.70 lakh tonnes with the productivity of 1185 kg/ha. This crop is grown in almost all the districts of the state except in areas receiving low rains and light soils in Saurashtra region. Major pigeon pea growing districts are Bharuch, Baroda and Surat.

Food security is essential to feeding a population that is always growing, but nutritional security is also now a global concern that is troubling researchers. The expression "poor man's meat" refers to pulse crops (Reddy, 2010) [2]. Pigeon pea is a backbone of nutritional security of our country. India produces about 90% of the world total production. Pigeon peas are the second-most significant pulse crop in the nation after gram and Gujarat ranks first in this regard. It is a significant source of the country's vegetarian population's protein needs and has a high protein content (23.1%). Most commonly, it is consumed as dal. Iodine and important amino acids including lycine, cystine, and arginine are also abundant in pigeon pea seed. For milch cattle, the seed's outer layer and some of the kernel make a rich meal. The husk of the pods and the leaves make valuable bovine feed, while the woody components of the plant are used for roofing and as fuel. Given that it is a legume crop, it has excellent qualities as a soil nitrogen restorative. It profusely adds the organic matter in the soil due to shattering of the leaves. It is a tap-rooted crop having indeterminate habit in flowering so it can withstand the adverse weather situation. Extensive cover of this crop prevents wind and water erosion of the soil.

Pigeonpea is grown in India's *kharif* season. Pigeonpeas exhibit a strong weed infestation due to the rainy season, delayed initial development and seeding at a larger row spacing, all of

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which contribute to low yield, because of its slow initial growth in vegetative phase so that very sensitive to weed competition. Only once they have grown to a height of roughly one meter can plants successfully compete with weeds. Therefore, one of the most crucial elements influencing high production is efficient weed management throughout the crop's early growth stage.

Weeds are the most yield limiting factor, especially in south Gujarat. When produced as a rainfed crop, pigeon peas have an early weed flora that consists primarily of annual grasses, which is later followed by perennial sedges and board-leaved weeds. So to study the crop weed relationship in pigeon pea, this research is being proposed.

### Materials and Methods

A field trial was performed at Agriculture Research Station, Navsari Agricultural University, Mangrol, District: Surat, Zone-II. To Study the critical period of crop-weed competition in pigeonpea under south Gujarat condition during *kharif* season-2018. A randomized block design was used to examine the experiment's 12 weed management treatments (Table 1) over three replications. *viz.*, W<sub>1</sub> =Weed free up to 15 DAS, W<sub>2</sub> = Weed free up to 30 DAS, W<sub>3</sub> =Weed free up to 45 DAS, W<sub>4</sub> = Weed free up to 60 DAS, W<sub>5</sub> =

Weed free up to 75 DAS, W<sub>6</sub> = Weed free up to harvest, W<sub>7</sub> = Weedy up to 15 DAS, W<sub>8</sub> =Weedy up to 30 DAS, W<sub>9</sub> = Weedy up to 45 DAS, W<sub>10</sub> =Weedy up to 60 DAS, W<sub>11</sub> = Weedy up to 75 DAS and W<sub>12</sub> = Weedy up to harvest. During the month of July, the seeds of the vaishali variety were manually sowing 90 cm between two rows at a rate of 12 kg per ha. At the time of planting, all treatments received the same amount of phosphorus and nitrogen through diammonium phosphate and urea (25-50-00 NPK/ha). In general, the weather was good for plant growth, and no serious pests or illnesses were found during experimentation. To sustain the crop, the recommended practices package was used.

### Weed flora

The dominant weed flora in field experiment site were *Digera arvensis*, *Eluropus villosus*, *Cyperus rotundus*, *Cynodon dactylon*, *Echinochloa crusgalli*, *Chenopodium album*, *Convolvulus arvensis*, *Euphorbia hirta*, *Echinochloa crusgalli* (L.) Beauv, *Trianthema monogyna*, *Amaranthus spinosus*, *Physalis minima*, *Commelina benghalensis*, *Amaranthus viridis* and *Asphodelus tenuifolius*. Similar weed flora were also reported by Kaur *et al.* (2015) [5]. Lunagariya *et al.* (2022) [3].

**Table 1:** Effect of various treatments on grain and stalk yields of pigeonpea

Treatments	Grain yield (kg/ha)	Stalk yield (kg/ha)
W <sub>1</sub> =Weed free up to 15 DAS	954	2162
W <sub>2</sub> = Weed free up to 30 DAS	988	2179
W <sub>3</sub> =Weed free up to 45 DAS	1039	2329
W <sub>4</sub> = Weed free up to 60 DAS	1239	2786
W <sub>5</sub> = Weed free up to 75 DAS	1050	2278
W <sub>6</sub> = Weed free up to harvest	953	2044
W <sub>7</sub> =Weedy up to 15 DAS	920	2094
W <sub>8</sub> =Weedy up to 30 DAS	889	1929
W <sub>9</sub> = Weedy up to 45 DAS	803	1881
W <sub>10</sub> =Weedy up to 60 DAS	866	1861
W <sub>11</sub> =Weedy up to 75 DAS	796	1812
W <sub>12</sub> = Weedy up to harvest.	753	1766
S.Em. (+)	34.08	79.94
CD @ 5%	102.07	235.999
CV %	6.43	6.61

Different weed control treatments were found to be significantly affected yields of pigeonpea over weedy up to harvest. The data presented in Table 1 revealed significantly influence on grain and stalk yield of pigeonpea crop by various treatments. Significantly highest yield was recorded with treatment W<sub>4</sub> (Weed free up to 60 DAS) as compared to various treatment. All weedy treatments found more weed infestation so that they suppress the growth of crop. So that ultimately reduce yields of crop. Lowest grain yield was recorded with W<sub>12</sub> (Weedy up to harvest). Weed free up to 60 DAS also recorded significantly highest stalk yield as compared to various treatment of weed management. While in case of lowest grain as well as stalk yield was found in treatment W<sub>12</sub> (Weedy up to harvest). This might also make it easier for moisture, nutrients, and solar energy to be available better, which would lead to higher vegetative growth. Similar finding were also established by Rathod *et al.* (2016) [4] and Amit *et al.* (2019) [1]. The significant higher yield was observed in treatments which in timely weed control over weedy up to harvest. This might be due initially weed control up to 60 DAS treated plot have comparatively higher weed

control over weedy up to harvest plots. It may be because weeds have been there since the start of the crop's emergence, which has caused intense competition between crop plants and weeds for nutrients, moisture, and sunlight. This result corroborates the finding of Jondhale *et al.* (2018) [7].

### Conclusion

Pigeonpeas are equally susceptible to weed infestation during the early stages of growth as are other pulse crops, thus the crop needs to be kept weed-free, especially in the first 6-7 weeks. Weed infestations have the potential to limit pigeon pea grain yield. By creating weed-free favorable conditions, weed management in pigeon pea can be efficiently accomplished. According to the farmer's point of view, maintaining weed conditions for up to 60 DAS is the most efficient way to control weeds while increasing grain and stalk yield and pigeonpea profitability.

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