

In-situ mulching of weeds in pigeon pea

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There are several constraints for low productivity of pigeon pea in Sehore district such as maximum area under rainfed conditions, lack of extra short-duration varieties, improper weed management practices and imbalanced use of fertilizers etc. Yield maximization in pigeon pea through in-situ mulching of weeds, balanced dose of fertilizers and selection of extra short-duration variety (ICPL-88039) for rainfed condition in Sehore district has proved to be beneficial.

PULSE crops play a vital role in our national economy and is considered as a main source of protein for human diets. Among the pulses, the pigeon pea is an important pulse crop being cultivated in 3.8 million hectares with an annual production of 2.4 million tonnes. However, national productivity of pigeon pea is quite low (780 kg/ha) as against their yield potential. In contrast, the productivity of pigeon pea crop in Sehore district of Madhya Pradesh is about 916 kg/ha which is slightly greater than the national productivity, however lesser than the yield potential of the crop. During *kharif* season in Sehore district, pigeon pea crop suffers due to heavy infestation of weeds which reduces about 40% yield depending on the density, duration and time of weed infestation. The weed plants compete with the crops for soil moisture, nutrient and sunlight which are very important components for plant growth. The introduction of extra short-duration variety and use of balanced dose of fertilizers may be a good practice for increasing the

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production and productivity of pigeon pea. However, the yield of extra short duration cultivar (ICPL-88039) is also affected due to heavy infestation of weeds and lack of soil moisture under the rainfed farming situation in the district while the yield potential of cultivar is about 1600-1800 kg/ha. To overcome this problem, the practice of in-situ mulching may be a good approach to increase the production and productivity of pigeon pea in the district by reducing the infestation of weeds and supply of soil moisture during dry spell at the critical stage of crop growth. In view of this, short

duration variety (ICPL -88039) with balanced dose of fertilizers (20:60:20 kg/ha NPK) along with more emphasis on in-situ mulching of weeds were undertaken for getting higher production of pigeon pea.

How to manage the weeds

No herbicides are capable to control all kind of weed flora altogether because herbicides are either selective or non selective types.

Besides these, improper use of chemical herbicides leads to emergence of resistance in weeds, water pollution and disturbances in the soil structure that poses negative

effect on standing crops as well as beneficial micro-organisms present in the soil. Therefore, hand weeding followed by *in-situ* mulching at 40-45 days after sowing may be a good approach for effective management of weeds in the pigeon pea cultivation. Surface mulching through uprooted weeds not only prevents the soil particle from blowing and beating action of rainfall but also reduces the evaporation rate that ultimately increases the soil moisture. Thus, to maintain a constant level of soil moisture in rainfed condition, the practice of *in-situ* mulching of weeds may be adopted in pigeon pea cultivation that would not only reduce the infestation of weeds but also increase the yield.

***In-situ* Mulching**

Covering of soil surface by weed plants between the row spaces of the crop is known as *in-situ* mulching of weeds. The uprooted weeds were placed uniformly in the rows of the pigeon pea field in such a way that root portion should be at the upper side. To attain this, the apical portion of subsequent weed plants were laid down below the roots of earlier weed plants so that their roots could not make contact with the soil, hence cannot regenerate. The practice of *in-situ* of mulching of weeds is quite successful with pigeon pea crop because it can be done easily due to good plant height of pigeon pea crop. Apart from this, it also increases the retention of soil moisture which might be very useful in rainfed conditions

The average annual rainfall in Sehore district is about 1261 mm and intercropping may also reduce the infestation of the weeds, however, the practice of *in-situ* mulching of weeds is more applicable and feasible in those areas where lands are undulated and there is scarcity of water. Thus, this practice is more suitable to reduce weed infestation in undulated fields and rainfed situation.

Table 1. Effect of *in-situ* mulching of weeds on pigeon pea yield

Treatment	Test wt (g)	No. of flower/plant	Fruit set (%)	No. of pods/plant	Yield (q/ha)	Increase Yield (%)
BDF + Pendimethiline @ 2 lit./ha.(PE)	88	240	30.0	73	10.3	35
BDF + <i>In-situ</i> mulching of weeds (40 DAS)	90	260	39.6	100.5	15.9	109
BDF + Hand weeding (40 DAS)	89	245	35.9	88	13.4	76
Control (without weeding + IDF)	88	230	25.9	58	7.6	0

Table 2. Effect of *in-situ* mulching of weeds on the economy of pigeon pea

Treatment	Cost of cultivation (₹/ha)	Gross return (₹/ha)	Net return (₹/ha)	Cost : benefit ratio
BDF+Pendimethalin@2lit./ha.(PE)	14,000	27,810	13,810	1:2.0
BDF+ <i>In-situ</i> mulching of weed (40-50DAS)	16,500	42,930	26,430	1:2.6
BDF+Hand weeding (40-45DAS)	15,500	36,180	20,680	1:2.3
IDF+Uncontrol weed	12,500	20,520	8,020	1:1.6

Table 3. Major weeds associated with pigeon pea crop

Scientific name	Common English name	Common name
Grasses		
<i>Echinichloa colona</i>	Jungle rice	Sanwa
<i>Echinichlona crus-galli</i>	Branyard grass	Barasanwak
<i>Cynodan dactylon</i>	Bermuda grass	Doob ghas
Sedges		
<i>Cyprus rotundus</i>	Purple nut stage	Motha
<i>Cyprus iria</i>	Yellow nut stage	Morephanata
Broad leave weeds		
<i>Commelina bengalensis</i>	Day flower	Kankawa
<i>Commelina comunis</i>	Day flower	Bokhna
<i>Euphorbia hitra</i> L	Garden spurge	Chhoti dudhi
<i>Euphorbia jenuculata</i>	Spurge	Badi dudhi
<i>Corochorus acutangulus</i> L	Pod rush	Jangle Jute
<i>Parthenium hysterophrous</i>	Carrot weed	Gajar ghas
<i>Abelmoscus maschtus</i>	Wild Okra	Jungli bhindi

Effects of mulching

It is clearly evident from the result that maximum yield was obtained from *in-situ* mulching (15.9 q/ha) followed by hand weeding (13.4 q/ha) pre-emergence weedicide (10.3 q/ha) and control (7.6 q/ha). It may be attributed to increase in number of flowers per plant, number of pods per plant. higher percentage of fruit setting and test weight due to availability of soil moisture at critical stage of crop growth on account of *in-situ* mulching of weeds. The practice of *in-situ* mulching along

with balanced dose of fertilizers and selection of extra short-duration cultivar (ICPL-88039) respectively maximized the yield of pigeon pea by 35.76 and 109 per cent over uses of pre-emergence weedicide, hand weeding and control (Table 1). Maximum gross return (₹ 42,930/ha), net return (₹ 26,430/ha) and cost benefit ratio (1:2.6) was obtained from *in-situ* mulching of weeds followed by hand weeding (₹ 36,180/ha, ₹ 20,680/ha and 1:2.3), pre-emergence weedicide (27,810, ₹ 13.810 and 1:2.0) and control

(₹ 20,520/ha ₹ 8,020/ha and 1:1.6) (Table 2). About 12 weed flora were recorded from pigeon pea fields, of which 04 weeds viz. *Commelina bengalensis*, *C. communis*, *Echinichloa colona* and *Euphorbia jenuculata* were considered as predominant weeds and rest other weeds were recorded as less predominant (Table 3).

SUMMARY

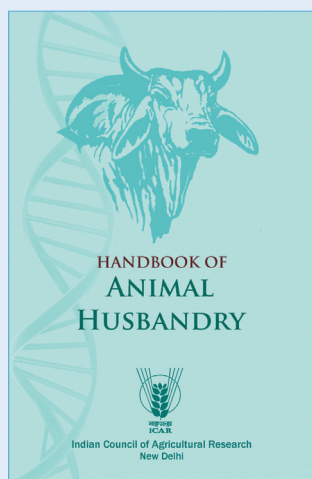
In pigeon pea cultivation, weeds are considered as major important factor for reducing pigeon pea production. About 40% reduction in pigeon pea yield occurred due to heavy infestation of weeds. In present

scenario, the chemical herbicides are being used to control different weeds flora however, it has certain limitations such as emergence of resistance in the weeds, hazardous effect over beneficial microbes, crops and environment, etc which prevent them to be used widely for the control of weeds. In this regard, manual weeding along with *in-situ* mulching may be a very common, ecofriendly and approachable practice for the management of weeds in pigeon pea cultivation. The practice of *in-situ* mulching along with balanced dose of fertilizers and selection of extra short-duration

cultivar (ICPL-88039) respectively maximized the yield of pigeon pea by 35.76 and 109 per cent over uses of pre-emergence weedicide, hand weeding and control. Maximum cost benefit ratio was obtained from *in-situ* mulching of weeds (1:2.6) followed by hand weeding (1:2.3) pre-emergence weedicide (1:2.0) and control (1:1.6). Selection of extra short-duration variety, use of balanced dose of fertilizer along with *in-situ* mulching of weeds is quite successful and ecofriendly practice for raising pigeon pea production under rainfed condition. ■

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TECHNICAL SPECIFICATIONS

Size	: Royal Octavo (16 cm x 24 cm)
No. of pages	: i-x + 1550
Price	: ₹ 1100
Postage	: ₹ 100
ISBN No.	: 978-81-7164-086-7

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