

NATIONAL AGRICULTURE RESEARCH PROJECT
COLLEGE OF AGRICULTURE,
NAVSARI AGRICULTURAL UNIVERSITY,
BHARUCH CAMPUS, BHARUCH

Recommendations made by center: 51.

	CROP IMPROVEMENT
1	Variety BDN-2 was released for grain purpose (1984). It is semi-determinate, small and white seeded, resistant to wilt and susceptible to <i>Helicoverpa</i> and SMD.
2	Variety GT 1 of pigeonpea is recommended for vegetable purpose (1991). It is early, high yielded, non-determinate, tolerant to wilt, <i>Helicoverpa</i> and pod fly. It has higher shelling percentage and sweet in taste.
3	Variety GNP-2 of pigeon pea is recommended for Dual (vegetable/grain) purpose (2016). Genotype with indeterminate growth habit with semi spread plant type with dark green foliage. The pods are green in colour, having good shining with 4 to 5 grains with prominent constriction compared to GT-1. Seed shape is globular which is more preferred by milling industry, consumers and farmers, moderately resistant to wilt, and moderately tolerant for pod fly and pod borer. (2015-16)
4	The pigeon pea variety GT-113 (Navsari Reva) was released for kharif season cultivation in Gujarat. The average yield of pigeon pea variety BP-16-184 (GT-113) is 1962 kg/ha. It has exhibited overall yield advantage of 27.29%, 18.48% 26.5% and 14.2% over the checks UPAS-120, BDN-711, GT-105 and GT-101 respectively. It matures within 138-148 days (Early group) with spreading in nature, straight green pod and 4-5 seeds per pod. This variety having 22.26% protein with cream white seed colour. It is moderately resistant against wilt & SMD.
	CROP PRODUCTION
5	The pigeon pea grower of Agro-climatic zone II are advised to inter crop their pigeon pea with black gram to 100:75 (3 lines of black gram @ 30 cm. between two rows of pigeonpea planted at 120 cm.) to get the highest net return (Rs. 26578) and CBR (1:5.2).
6	For maximizing economic return to the farmers of rain fed areas of south Gujarat, pigeonpea should be intercropped with Urid or Mung (1:2) (1990)
7	The pigeonpea grown under rain fed conditions should be planted at 90 cm row to row and 20 cm from plant to plant distance for maximum yield and net return (1987).
8	To have effective weed management in rain fed pigeonpea, farmers are advised to have one hand weeding at 30 DAS followed by one interculturing. Under the heavy rainfall areas, farmers may use Fluchloraline or Pendimethaline @ 1.0 lit a.i./ha followed by one inter culturing at 60 DAS (1989).
9	In the Agro-ecological situation-V of South Gujarat zone, mulching with black plastic can increase the rain fed pigeonpea yield by 23%, yet at the present cost of plastic, it is

	not economically viable. Wherever feasible, the farmers are advised to adopt grass mulching @ 5 t/ha immediately after the cessation of monsoon to get about 12% more income (1994).
10	The farmers of south Gujarat zone, growing pigeonpea variety BDN-2, Nylon or Bhadbhoot under rain fed condition in Sulphur deficit soils are advised to apply Sulphur @ 20 kg /ha through gypsum along with the recommended dose of N & P (20 & 40 kg/ha) as this treatment showed additional net income of Rs.2475/ha with ICBR of 1:40 (1995).The marginal farmers can apply Sulphur @ 20 kg/ha and can earn more income of Rs. 900/ha with ICBR [1:29].
11	The pigeon pea growers of south Gujarat Agro climatic zone II are advised to thin their crop when it is 30 days old with keeping plant to plant distance of 20 cm (1995).
12	The pigeonpea growers of AES V of south Gujarat zone II are advised to adopt integrated weed management (Pendimethaline 1 lit a.i./ha + inter culturing at 60 DAS) instead of manual weeding in order to obtain higher yield and monitory return (1996).
13	The farmers of south Gujarat zone (AES III), growing pigeonpea (BDN-2) as main crop are advised to rotate their pigeon pea crop with either castor (GCH-4) to get 105% or cotton (G.Cot.11) to get 44% higher economic return as compared to pigeon pea followed by pigeon pea (1999).
14	The farmers of south Gujarat zone (AES II) are advised to open a furrow of 22.5 cm depth at every 5 m distance. Five lines of pigeon pea should be sown on the raised bed (1999).
15	Pigeonpea (GT 1) growers of south Gujarat zone (AES III) are advised to cultivate their crop geometry of 120 cm x 30 cm (1999).
16	Pigeon pea growers of agro climatic zone II, AES-V are advised to fertilize pigeon pea (GT-1) with 10 tonnes FYM + 75% R.D. [20:40:00] NPK kg/ha to get higher net return [Rs. 15546] and CBR [1:3.4] to reduce 25% chemical fertilizer.
17	The farmers of South Gujarat agro climatic zone (AES-II) growing pigeon-pea under rain fed condition are recommended to apply the recommended dose of fertilizer (20-40 kg NP/ha) along with FYM /bio compost @ 7.5 t/ha before monsoon through band placement for higher yield and net return.(2015-16) NI1F6 UHZFT BT VFAlCJfSLI 5IZI:YtLvZ GF B0Tl S HVll JZ ; FN VFWFZLT TJZGll 5FS , TF Clll TVllG E , FD6 SZJfDF VFJ K S4 TJZG JW pt5fNG VG RllbBl G0ll D/JJf Df8 E , FD6 SZ , sZ_v\$ _ ISUF GFPOffq CPf BFTZ ; FY CS8Z NL9 *P5 8GqCP Kf6LI BFTZ S AfIl Sd5llQ8 RllDF ; A ; TF 5C , F CfZDF VF5JP
18	The farmers of South Gujarat Agro-climatic Zone growing rainfed pigeonpea are recommended to sow pigeonpea at 120 cm row spacing with two rows of soybean or greengram as intercrop for obtaining higher yield and net profit. (2018-19) દક્ષિણ ગુજરાત ખેત આબોહવાકીય વિસ્તારમાં વરસાદ આધારીત તુવેર ઉગાડતા ખેડૂતો ને વધુ ઉત્પાદન અને ચોખ્ખો નફો મેળવવા તુવેરનું વેતર બે હાર વચ્ચે ૧૨૦ સે.મી. અંતરે કરી સાથે આંતરપાક સોયાબીન અથવા મગની બે હારનું વાવેતર કરવાની ભલામણ

	કરવામાં આવે છે. (૨૦૧૮-૧૯)
	PLANT PROTECTION
	A. ENTOMOLOGY
19	Economic control of pest complex in pigeonpea, 3 spraying of Monocrotophos @ 0.04% or Endosulfan @ 0.07% should be done at the initiation of flowering, at 50% flowering and at 50% podding (1987).
20	In water scarcity areas of south Gujarat region, pigeonpea crop should be dusted with Methyl parathion 2% dust @ 25 kg/ha three times at the initiation of flowering, at 50% flowering and at 50% flower podding (1987).
21	For effective control of insect-pest in pigeonpea and to get maximum NICBR, the crop should be sprayed with Endosulfan @ 0.07% at threshold level, i.e. 2% damage level and only one spraying is sufficient. However in heavily infested areas 3 spraying of these insecticides is essential (1989).
22	In <i>Helicoverpa</i> infested areas, late varieties of pigeonpea and in pod fly problematic areas, early varieties of pigeonpea is advised (1987).
23	Pigeon pea varieties PPE 45-2 and AL 57 have been observed moderately resistant against <i>Helicoverpa</i> and pod fly (1990).
24	Two dusting of Quinalphos 1.5 % dust @ 25 kg/ha at 50% flowering and subsequently at 50% pod setting are recommended to the marginal and small farmers for the control of podfly in pigeonpea under south Gujarat condition (NICBR 1:7.0) (1990).
25	Three spraying of 5% Neem Seed Kernel Extract (NICBR 1:10.04) at the initiation of flowering, at 50% flowering and at 50% podding stage are recommended to the economically backward farmers for the control of pod borer in pigeonpea under south Gujarat medium rainfall zone (1993).
26	Farmers of south Gujarat Agro-climatic zone II are advised to spray two rounds of NPV 500 l/ha with 0.1% teepol followed by Endosulfan @ 0.07% at an interval of one week [net income Rs 15754/ha with CBR 1:3.48]. OR Two sprays of Endosulfan @ 0.07% alone at 15 days interval [net income 14061 Rs./ha with CBR 1:4.13] (1995). OR Spray three rounds of NPV 500 l/ha with 0.1% teepol at weekly intervals (CBR 1:2.38) from initiation of first instar larvae to control pod borer in pigeonpea (1995).
27	Application of Dicofol @ 0.04% is recommended for effective control of spider mite <i>Eotetranychus broodryki</i> on pigeon pea (1998).
28	Three applications of wettable sulfur 80 WP @ 0.125% or Dicofol 18.5 EC @ 0.04% or Endosulfan 35 EC @ 0.075% at 35, 65 and 95 days after sowing of pigeonpea crop is recommended for suppression of pigeonpea Sterility Mosaic Disease (SMD) incidence (1998).
29	Earlier recommendations (i) three applications of Endosulfan @ 0.07% and (ii) NSKE @ 5% for the control of pod borers in pigeon pea are confirmed.

30	For effective control of pod borer [<i>H. armigera</i>] and pod fly [<i>M. obtusa</i>] and getting higher yield, the pigeonpea cultivars of south Gujarat [middle rainfall] AES-V are advised to spray any of the following insecticide viz; Triazophos 35 % + Deltamethrin 1% [Spark 36 EC] @ 0.036% [ICBR 1:7.68]; Profenophos 50 EC @ 0.04% [ICBR 1:6.81]; Chlorpyriphos 50% + Cypermethrin 5% [Nurele-D ₅₀₅ 55 EC @ 0.055% [ICBR 1:6.19] or Profenophos 40% + Cypermethrin 4% [Polytrin C-44 EC] @ 0.044% [ICBR 1:5.77] whenever pod borer cross the ETL [at flowering stage 20 larvae/20 plants & at pod formation stage 10 larvae/20 plants] (2005).
31	For effective and economical management of pigeon pea mealybug, <i>Coccidohystrix insolita</i> Green, farmers of South Gujarat AES-V are advised to apply two sprays Profenophos 50 EC, 0.06% (12 ml / 10 litre of water) or Chlorpyriphos 20 EC, 0.05% (25 ml / 10 litre of water) or Acetamiprid 20 SP, 0.004% (2 gm / 10 litre of water) at 15 days interval starting from initiation of incidence. Further, the residue of these insecticides remained below determination level in dry grains of pigeonpea. The period between last application and harvesting for Profenophos 50 EC, 0.06% (12 ml / 10 litre of water), Chlorpyriphos 20 EC, 0.05% (25 ml / 10 litre of water) and Acetamiprid 20 SP, 0.004% (2 gm / 10 litre of water) should be 20, 42 and 20 days, respectively. (2012).
32	For effective management of pod borers in pigeonpea, farmers of South Gujarat AES-V are advised to apply two sprays of Chlorantraniliprole 18.5 SC, 0.006 % (3 ml / 10 lit of water) or Flubendiamide 48 SC, @ 0.0096% (2 ml / 10 lit of water); first at 50% flowering and second at 50% pod formation stage for getting higher yield and better returns. Further, the residues of these insecticides remained below determination level in dry grains of pigeonpea. The period between last application and of harvesting for Chlorantraniliprole 18.5 SC, 0.006 % (3 ml / 10 lit of water) and Flubendiamide 48 SC, @ 0.0096% (2 ml / 10 lit of water) should be 47 and 30 days, respectively. (2012).
	Information for Scientific Community:
33	The pigeonpea genotypes BP-06-38, BP-07-09 and BP-07-05 were found less susceptible against pod borer, whereas, BP-07-12, BP-01-110 and BP-06-33 were found less susceptible against pod fly. (2012)
34	The peak activity of moths and larvae of <i>Helicoverpa armigera</i> in pigeonpea were showed during mid of November to March and end of October to December, respectively. Seasonal & yearly moth and seasonal larval activities of <i>H. armigera</i> were significantly negatively correlated with minimum temperature, morning & evening relative humidity, rainfall and rainy days, while it was significantly positive correlated with sun shine hours. <i>H. armigera</i> moths were significantly negatively correlated with maximum temperature and wind speed during crop season and year, respectively. Seasonal larval incidence and moth catches of <i>H. armigera</i> were showed significantly positive correlation (2014)
35	Two sprays of any of the following insecticide at an interval of 15 days commencing at pod formation stage are effective to control pod bug, <i>Clavigralla</i>

	<i>gibbosa</i> Spinola in pigeon pea. Imidacloprid 17.8 SL @ 0.005 % Acetamiprid 20 SP @ 0.004% Thiacloprid 24 SC @ 0.024% (2016-17)																
36	The pigeon pea pests were active round the year under Agro climatic zone II, AES V with higher activity period mentioned as under with standard meteorological week (SMW). <table border="1"> <thead> <tr> <th>Pest</th><th>Higher activity period</th></tr> </thead> <tbody> <tr> <td>Aphid</td><td>36, 38, 39, 45 and 46th SMW</td></tr> <tr> <td>Jassid</td><td>37, 38, 39, 43 , 47 and 48th SMW</td></tr> <tr> <td>PSB</td><td>49th to 2nd SMW</td></tr> <tr> <td>MBDR</td><td>45th SMW</td></tr> <tr> <td><i>Helicoverpa</i> sp.</td><td>47 to 50th SMW</td></tr> <tr> <td><i>Maruca</i> sp.</td><td>48 and 49th SMW</td></tr> <tr> <td>Leaf Roller</td><td>41st to 43rd SMW</td></tr> </tbody> </table> (2016-17)	Pest	Higher activity period	Aphid	36, 38, 39, 45 and 46th SMW	Jassid	37, 38, 39, 43 , 47 and 48th SMW	PSB	49th to 2nd SMW	MBDR	45th SMW	<i>Helicoverpa</i> sp.	47 to 50th SMW	<i>Maruca</i> sp.	48 and 49th SMW	Leaf Roller	41st to 43rd SMW
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37	Three sprays of spiromesifen 22.9 SC @ 0.005% (2 ml/10 lit) or fenazaquin 10 EC (10 ml/ 10 lit) @ 0.01% at 25, 40 and 55 days after sowing which effectively control pigeonpea eriophyid mite, <i>Aceria cajani</i> and give higher seed yield and net return. Further, the residues of these acaricides were found below determination level in pigeonpea seeds and plant residue. (2017-18)																
38	Infestation of pod borers and pod fly was less in the pigeon pea entries viz., NPEK-15-03, NPEK-15-25, ICPL-87119, NPEK-15-09, BP-15-23, GJP-1303, SKNP-1413, AGT-2 and BP-15-11. (2019-20)																
39	The pigeon pea growers are recommended to follow the following IPM strategy for reducing pod fly infestation as well as in gaining higher grain yield with low input cost. ❑ Interspersing of sorghum and maize @ 1% ❑ Installation of trap baited with 20 ml ethanol @ 20/ha during 50% flowering up to maturity and during this duration recharge traps at 15 days interval ❑ Application of NSKE @ 5% at 5 day old age pod period followed by emamectin benzoate 5 SG @ 0.0011% (2.2g /10 lit.) and acetamiprid 20SP @ 0.004 (2.0g /10 lit) at 10 days interval (2021-22) Trap Details: For preparing a trap 1 litre plastic water bottle will be used and underside of it will be wrapped with white paper. The middle portion of bottle is to be cut in 2x2 inch size for inserting a 20 ml ethanol suspended plywood block which remains hang in the bottle તુવેરની ખેતી કરતા ખેડૂતોને ઓછા ખર્ચે શીંગમાખીના ઉપદ્રવને નિયંત્રણમાં રાખી વધુ ઉત્પાદન મેળવવા નીચે દર્શાવેલ સંકલિત કિટવ્યવસ્થા અપનાવવાની ભલામણ છે.																

	➤ તુવેરના પાકમા જુવાર અને મકાઈ ના છોડ ૧% ના દરે છૂટાછવાયા ઉગાડવા. ➤ ૨૦ મી.લી. ઇથેનોલ દ્રાવણ થી બનાવેલ ટ્રેપ હેક્ટર દીઠ ૨૦ મુજબ પાક ની ફૂલ અવસ્થાથી શીંગ પરિપક્વ અવસ્થા સુધી ગોઠવવા તેમજ ઉપરોક્ત સમયગાળા દરમ્યાન ૧૫ દિવસ ના અંતરે ટ્રેપ રિચાર્જ કરવા. જંતુનાશક દવાઓ પૈકી પ્રથમ છંટકાવ લીંબોળીના મીજના ૫% દ્રાવણ નો શીંગ બેસવના ૫ દિવસ બાદ અને ત્યાર બાદ ઇમામેક્ટીન બેન્ઝોએટ ૫ એસ. જી. , ૦.૦૦૧૧% (૨.૨ ગ્રામ/૧૦ લી) અને એસીટામીપ્રીડ ૨૦ એસ.પી., ૦.૦૦૪% (૨ ગ્રામ/૧૦ લી.) ના ૧૦ દિવસ ના અંતરે કરવા (2021-22) ટ્રેપ બનાવવાની રીત: ૧લીટર ક્ષમતા વાળી ખાલી પાણીની બોટલલો અને તેના મધ્યભાગમા ૨ ઇચનો કાપ મૂકો .આ કાપમાથી સફેદ કાગળ દાખલ કરી બોટલના અંદરના ભાગને કવરકરો ત્યારબાદ ૨૦ મીલી ઇથેનોલ દ્રાવણથી સંતૃપ્ત પ્લાયબ્લોક બોટલમા લટકતો રહે તેરીતે દાખલ કરો.
	B. PLANT PATHOLOGY
40	For effective control <i>Fusarium</i> wilt in pigeonpea and to get maximum NICBR, the seed should be treated with TMTD (Thirum) @ 3 g/kg seed. If TMTD is not available, farmers are advised to use Captafol (Foltaf) (1990).
41	The furrow application of bio-control agent <i>Trichoderma harzianum</i> multiplied on FYM @ 200 g/mt row length (2222 kg/ha) followed by sowing Carbendazim treated seeds (3 g/kg seed) is recommended to the farmers of Agro-climatic south Gujarat zone for the effective control of pigeon pea wilt and getting higher return (Rs. 8173) (1997).
42	The pigeon pea growing farmers of south Gujarat zone are advised to adopt the practice application of press mud @ 10 t/ha after solarizing the field through transparent (LLDPE 25 micron) Polyethylene sheet for one month to reduce the wilt incidence by about 50 percent increased the yield by 100 per cent and net return by 50 per cent (1997).
43	Farmers of south Gujarat zone (AES V) are advised to coat pigeon pea seeds with PBA 22 <i>Torulospora globosa</i> (ICBR 1:513) or PBA 13 <i>Bacillus coagulans</i> (ICBR 1:379) each having 10 ⁸ CFU/gm carrier @ 30 gm culture/kg seed before seeding to save 40 kg P ₂ O ₅ /ha and get maximum green pod yield.
44	Pigeonpea growing farmers of south Gujarat Agro climatic zone II are advised to treat seeds with <i>Rhizobium</i> culture (ARS-21) 10 CFU/gm @ 30 g/kg seeds to save 20 kg N and to get maximum grain yield (CIBR 1:283). (2001).
45	It is recommended for scientific community that lines BPWR-03-1 and BPWR03-2 were found resistant to wilt disease which could be utilizing further breeding programme in future to evolve wilt resistant variety.(2003)
46	Line BPWR-04-2 [Selection from PF-3] was found resistant to wilt disease which could be utilized in further breeding programme in future to evolve wilt resistant variety

	(2005).
47	Seed soaking in the solution of chitinolytic bacterium (<i>Pentoea dispersa</i>) @10 ⁸ viable cells/ml for four hours before sowing was found effective for the management of wilt (<i>Fusarium oxysporum f. sp .udum</i>) of pigeonpea.2008
48	Pigeon pea growers of South Gujarat are advised to apply <i>Trichoderma viride</i> 1 per cent WP @ 10 g/kg (1×10⁸ cfu/g) as seed treatment and @ 2.5 kg /500 kg FYM /ha in furrow at the time of sowing for effective management of wilt and to get higher grain yield and net profit.(2016-17) દક્ષિણ ગુજરાતના તુવેર ઉગાડતા ખેડૂતને સુકારા રોગના અસરકારક નિયંત્રણ માટે અને વધુ ઉત્પાદન તેમજ ચોખ્ખી આવક મેળવવા માટે તુવેરને ટ્રાઇકોડરમા વીરીડી ૧% વે.પા. ૧૦ ગ્રામ/ કી.ગ્રા. ૧ ટકા વે.પા. (૧ × ૧૦^૮ સીએફયુ પ્રતિ ગ્રામ) ની બીજ માવજત અને ૨.૫ કી.ગ્રા./૫૦૦ કી.ગ્રા. છાણીયા ખાતર / હેક્ટર ભેળવી વાવણી સમયે ચાસમા આપવાની ભલામણ કરવામા આવે છે. (2016-17)
	Information for Scientific Community:
49	The pigeon pea genotypes GAUT-9317 and ICPL 87119 x BP-94-03 were found Moderately Resistant against Sterility Mosaic Disease. (2012).
50	The spraying of either fenazaquin 10 EC @0.01% or propargite 57 EC @ 0.1% after 25 days of sowing and second at 15 days after first spray was found significantly most effective to manage Sterility mosaic disease through vector control and gave higher seed yield and better net profit of pigeon pea in SMD nursery. Further the residues of these insecticides (2017-18)
51	The avoidable loss of grain and stover yield in pigeonpea recorded 31.57 and 10.23 per cent, respectively by diseases. Amongst the diseases, virus (sterility mosaic) followed by wilt fungus (<i>Fusarium udum</i>) causing maximum loss. (2023-24)