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DEVELOPMENT OF MULTIPLEDISEASE RESISTANTCHICKPEA VARIETY -PDKV KANAK

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ABSTRACT: The major goals of chickpea breeding are to increase production either by upgrading the genetic potential of cultivars or by eliminating the effect of diseases. More than 50 pathogens have been reported to affect chickpea Fusarium wilt is the major disease affecting chickpea crop in the whole country. Incorporation of disease resistant against Fusarium wilt in improved varieties has always been an important part of chickpea breeding programme for reduced losses due to diseases and stabilized chickpea yield. PDKV Kanak (AKG-1303) is a multiple disease resistance, high yielding and suitable for mechanical harvesting variety of chickpea (*Cicer arietinum L.)* derived through hybridization followed by pedigree selection method from a cross of SAKI-9516 X AKG-70. It has high yielding suitable for mechanical harvesting, early and synchronous maturity with medium bold grain size (21.76 g per 100 seed). In AICRP (AVT-2 trial) seventeen entries were evaluated against wilt at 12 locations in different zones. Out of these, entries PDKV Kanak (AKG-1303) showed Resistant to moderately resistant for Fusarium Wilt, at 6 or more locations, and also for Dry root rot & Collar rot.

Key words: - Chickpea, disease resistant and Machine harvestable

INTRODUCTION:

Chickpea (Cicer arietinum L.) is the world's third most important pulse crop, after dry beans (*Phaseolus vulgaris L.)* and dry peas (*Pisum sativum L.*) (Although, chickpea is predominantly consumed as a pulse, dry chickpea is also used in preparing a variety of snack foods, sweets and condiments and green fresh chickpeas are commonly consumed as a vegetable. Fusarium wilt caused by *Fusarium oxysporium*, is one of the major soil / seed borne disease of chickpea (*C. arietinum L.*). At national level the yield losses encountered due to wilt may vary between 40 to 60 percent. The pathogen is both seed and soil borne; facultative saprophyte and can survive in soil up to six years in the absence of susceptible host (*Haware et al.* 1978 and 1986). Considering the nature of damage. Development of disease resistance, variety is essential to reduce the cost of cultivation and crop damage

Use of resistant varieties is the only economical and practical solution. Most of the resistant varieties have been found to be susceptible after some years because of breakdown in their resistance and evolution of variability in the pathogen. Wilt complex, which manifests itself by vascular wilting or root rots, is one of the most devastating and challenging diseases, which can damage crop at any stage. The wilt pathogen can survive in soil in the absence of host.

Thus there is considerable potential of augmenting the yield of chickpea by minimizing the losses inflicted by the wilt complex. Keeping in view the importance of disease, socio-economic status of the crop and the inadequate research work carried out on the

MATERIAL AND METHODS:

The chickpea genotype PDKV - Kanak has been evolved from a cross of SAKI-9516 X AKG-70. at Pulses Research Unit, Dr. Panjabrao Deshmukh

Krishi Vidyapeeth, Akola (M.S). Among the several selections made in segregating population, a promising strain PDKV- Kanak (AKG-1303) was evaluated in station trial at Akola during 2013-14 and in multilocation trials during 2014-15 to2017-18.

Tested in All India Coordinated Research Project on Chickpea for three years during 2016-2017, 2017-18 and 2018-19 in Western Central Zone & it was found superior over the check GCP-101 (17.03%), JG-16(6.37%) and JAKI 9218(13.47%). (Table_ 1) In advance Varietal trial (AVT2+1Desi), variety PDKV-KANAK was Resistant to moderately resistant for Fusarium wilt at 6 or more locations in different zones of India.

RESULTS AND DISCUSSION:

AKG-1303 was evaluated in station trial at Akola during 2013-14 and in multilocation trials during 2014-15 to2017-18, genotype PDKV- Kanak was showed promising over the predominantly grown varieties under irrigation. It has been again rigorously tested in state multilocation trials during 2014-15 to2017-18, for its confirmation.

Then tested in All India Coordinated Research Project on Chickpea for three years during 2016-2017, 2017-18 and 2018-19 in Western Central Zone & it was found superior over the check GCP-101 (17.03%), JG-16(6.37%) and JAKI 9218(13.47%). (Table --1). In advance Varietal trial (AVT2+1Desi), variety PDKV-KANAK was Resistant to moderately resistant for Fusarium wilt at 6 or more locations in different zones of India. For Dry root rot variety PDKV-KANAK observed resistant at NEPZ location sabour found resistant(7.921%) in south zone also observed moderately resistant at two locations & For Collar rot these entry in AVT2 +1Desi trial at NEPZ location these variety observed moderately resistant at Shillongani (10.56%) and at CZ location at Jabalpur observed totally resistant (0.00%). For Botrytis Grey mold resistance at NWPZ at 2 location observed resistant at 1 location and moderately resistant at other locations. In Ascochyta Blight these variety was screened under artificial condition at Ludhiana, IARI and ICRISAT these variety was reported moderately resistant to Ascochyta Blight. (Table No .2) Hence there is vital need to developed new variety suitable for mechanical harvesting along with higher yield, hence this genotype PDKV KANKA (AKG-1303) showed the ray of hope for saving farmers cost and breaking yield plateau in chickpea

Hence there is vital need to Development of disease resistance ,variety is essential to reduce the cost of cultivation and crop damage ,also suitable for mechanical harvesting along with higher yield ,hence this genotype PDKV KANAK (AKG-1303) showed the ray of hope for saving farmers cost and breaking yield plateau in chickpea

Therefore, it was release for commercial cultivation to the farmers of Western Central Zone (Maharashtra, Gujarat and Western Madhya Pradesh) due to its special character i.e. Multiple disease resistant, high yielder, tall semi-erect growth habit suitable for mechanical harvesting.

CONCLUSION:

PDKV-Kanak(AKG-1303) variety found higher yield ,tall and semi erect plant growth habit (Avg. 54 cm),Medium bold (23.68 g per 100 seed) grain,Early and synchronous maturity (109 days),Resistant to Fusarium wilt in wilt sick plot and fruiting zone starting at about 33.40 cm from the ground considered suitable option for mechanical harvesting in rabi under protective irrigated planting for commercial cultivation to the farmers of Western Central Zone (Maharashtra, Gujarat and Western Madhya Pradesh) due to its special character.

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Table 1. Summary of grain yield data of Coordinated Varietal Trials during 2016 to 2018

Name of proposed variety: PDKV-Kanak Adaptability Zone -WCZ

Production conditions-Rabi (irrigated) timely sown

Particulars	Year of testing	No. of trials/ locations	Proposed variety	National Check 1	Zonal Check 2	Local check 3	Latest release Check 4	Qual. Var. 1	Qual. Var. 2	Qual. Var. 3
			AKG-1303	GCP-101	JG 16	JAKI-9218	DCP 92-3	Phule G 0818	--	--
Mean grain yield (Kg/ha)	1st year (IVT)2016-17	10	2610	2360	2466	--	--	2706		
	2nd year (AVT-1) 2017-18	8	2341	1722	2123	--	--	2205		
	3rd year (AVT-2)2018-19	8	2460	2217	2340	2168	2129	--		
	Weighted Mean	26	2481	2120	2322	2168	2129	2483 (18)		
Percentage increase or decrease over the checks & qualifying varieties	1st year (IVT) 2016-17			10.59	5.84	--	--	0.00		
	2nd year(AVT-1) 2017-18			35.95	10.27	--	--	6.17		
	3rd year(AVT-2)2018-19			10.96	5.21	13.47	15.54	--		
	Weighted mean	26		17.03	6.85	13.47	15.54	0.00		
Frequency in the top three group	1st year (IVT) 2016-17		5/10	3/10	3/10	-	5/10	5/10		
	2nd year(AVT-1) 2017-18		5/8	1/8	2/8	--	--	5/8		
	3rd year(AVT-2)2018-19		5/8	3/8	4/8	2/8	1/8	--		
Frequency in the top three group (pooled for three years)	Weighted mean 2016-2019	26	15/26	7/26	9/26	2/8	6/18	10/18		

Ref. AICRP on Chickpea Annual Report of 2016-17 pp no.56, 2017-18 pp no.41

Center wise and year-wise data of seed yield (kg/ha) appended at Annexure-II

Table 2. Reaction to major diseases at different locations Name of proposed variety:AKG-1303

Adaptability Zone -WCZ

Production conditions-Rabi (irrigated) timely sown (Fusarium Wilt Sick Plot)

Disease name	Year of testing	No. of trials/ locations	Proposed Variety		National Check 1		Zonal Check 2		Local check 3		Latest release Check 4		Qual. Var. 1	
			AKG-1303		(R)		(S)		JG 16		--		Phule G 0818	
			Locations		Location		Locations		Locations		Locations		Locations	
			R	MR	R	MR	R	MR	R	MR	R	MR	R	MR
Wilt (%)	1st year (IVT)2016-17	13	2	-	-	-	-	-	-	-	-	-	-	-
	2nd year (AVT-1) 2017-18	11	6	1	8	2	-	-	-	-	-	-	2	3
	3rd year (AVT-2)2018-19	12	4	3	7	-	-		3	5	-	-	- -	- -
DDR (%)	1st year (IVT)2016-17	-	-	-	-	-	-	-	-	-	-	-	-	-
	2nd year(AVT-1) 2017-18	6	1	1	3	-	-	-	-	-			1	1
	3rd year (AVT-2)	7	2	2	1	1	-	-	3	2	-	-	-	-
Collar rot (%)	1st year (IVT)2016-17	-	-	-	-	-	-	-	-	-	-	-	-	-
	2nd year (AVT-1) 2017-18	4	-	1	2	-	-	-	-	-	-		-	-
	3rd year (AVT-2)2018-19	4	1	1	1	-	-	-	-	1				
STUNT (%)	1st year (IVT)2016-17													
	2nd year(AVT-1) 2017-18	-	-	-	-	-	-	-	-	-	-	-	-	
	3rd year(AVT-2)2018-19	2	1	1	1	-	-	-	-	-	-	-	-	

Ref.: AICRP on Chickpea Annual Report of 2016-17 (pp no.239 &,263) and 2017-18 (pp. no.231, 241, 248 & .26

Table 3. Reaction to major diseases Name of proposed variety: AKG-1303 Production conditions-Rabi (irrigated) timely sown (*Fusarium* Wilt Sick Plot) Adaptability Zone –WCZ

Disease name	Year of testing	No. of trials/locations	Proposed Variety	National Check 1	Zonal Check 2	Local check 3	Latest release Check 4	Qual. Var. 1
			AKG-1303	JG 315(R)	JG 62(S)	JG 16	-	Phule G 0818
Wilt (%)	1st year (IVT)2016-17	7	37.22	-	63.84 (6)	-	-	15.11
	2nd year (AVT-1) 2017-18	6	17.22(MR)	5.80()	98.28 (S)	-	-	-
	3rd year (AVT-2)2018-19	6	14.62(MR)	8.32 (R)	86.16 (S)	22.68(S)	-	-
DDR (%)	1st year (IVT)2016-17	2	44.57		50.51(1)	-	-	51.86
	2nd year(AVT-1) 2017-18	2	55.82(S)	8.80(R)	81.77(S)	-	-	68.12 (S)
	3rd year (AVT-	2	34.37	25(L.1)	74.11(L550)	23.80	-	59.99
Collar rot (%)	1st year (IVT)2016-17	2	66.68		82.11	-		59.49
	2nd year (AVT-1) 2017-18	3	51.35(S)	3.45(R)	82.67 (S)	-	-	60.48 (S)
	3rd year (AVT-2)2018-19	3	81.41(L.2)	8.6(1)	62.15 (2)	56.68	-	-
STUNT (%)	1st year (IVT)2016-17		-	-	-	-	-	-
	2nd year(AVT-1) 2017-18	1	22(S)	15(MR)	30(S)	-	-	27(S)
	3rd year(AVT-2)2018-19	2	12.66	6.1(1)	63.4(1)	-	-	-

Ref.: AICRP on Chickpea Annual Report of 2016-17 (pp. no.239 & 263), 2017-18 (pp. no.231, 241, 248 &. 269)