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Response of different greengram (*Vigna radiata* L.) varieties under varying crop geometry in central plain zone of Uttar Pradesh

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Abstract
A field experiment was conducted at students' Instructional Farm, Department if Agronomy. Chandra Shekhar Azad University of Agriculture and Technology Kanpur (U.P) in summer season for two consecutive years (2019 and 2020). The objective to study the response of selected greengram varieties under different crop geometry. Split plot design was adopted with three replications. The main plot treatments were three varieties (PDM 139, IPM 205-07 and IPM 99-125) and sub plot were three crop geometry (15 x 10 cm, 22.5 x 10 cm and 30 x 10 cm). Result revealed that greater plant height was obtained from varieties IPM 99-125 whereas compare to variety of IPM 205-07 and variety PDM 139. And also Variety IPM 99-125 produced significantly higher growth number of branches plant^{-1}, leaf area index, and fresh and dry matter accumulation. However, variety IPM 205-07 was obtained maximum yield attributes *viz.*, pod length, number of seed pod^{-1}, seed weight plant^{-1}, number of pod plnat^{-1} and test weight and also it was found minimum days to flower initiation, days to 50% flowering and days to pod initiation. This might be due to variety characters and environmental factor. Crop geometry 30 x 10 cm was obtained maximum growth parameter *viz.*, plant height, number of branches plant^{-1}, leaf area index, fresh and dry matter accumulation and it was also noticed that earlier days to flowering, days to 50 % flowering and days to pod initiation and was followed crop geometry 22.5 x 10 cm. Significantly higher yield attributed *viz.* number of pod plant^{-1}, pod length, number of seed plsnt^{-1} ,seed weight plant^{-1} , and test weight were recorded with crop geometry 22.5 x 10 cm and was followed by crop geometry 30 x 10 cm and significantly lowest with crop geometry 15 x 10 cm. Variety IPM 205-07 was performed better yield attributes higher seed yield and protein content in grain over the variety IPM 99-125. Variety 205-07 significantly higher nitrogen, phosphorous and potassium uptake by plant was observed during summer greengram.

Keywords: Greengram varieties, crop geometry, days to flowering, growth and yield, nutrient content and their uptake

Introduction
Greengram is locally known as "*Mung*". It is a rich source of protein (24%) and also contributes carbohydrates (60%), fat (1.5%), amino acids, fiber (4.10%), vitamins and minerals (3.5%) *etc.* which form an important part of vegetarian diet. It is a short duration crop, tolerant to photoperiod and thermal variations, and thus has scope for expansion in time and area during spring and summer seasons**.** India is the major producer of greengram in the world and it is grown in almost all the states. The important greengram producing states in the country are Rajasthan, Maharashtra, A.P and M.P. The total area under cultivation of greengram is 4.5 million ha with total production of 2.5 million tones and productivity 548 kg ha^{-1}. The area under Summer Greengram is 9.65 lakh ha with production 5.67 lakh tones and productivity of 600 kg ha^{-1}**.** (Anonymous 2021) [1].
Improved varieties of greengram hold promise to increase productivity by 20-25%. The farmers are using cultivars, which have low yield potential and heavy incidence of YMV. One of the major constraint of poor yield and spread of greengram is the poor awareness about of suitable high yielding varieties to replace the traditional varieties. A good number of high yielding short duration mungbean varieties are recommended for cultivation during summer but their performance under rice-wheat cropping system under different crop geometry is so for not evaluated. The mungbean is generally sown during second week of April in rice-wheat cropping system. The evaluation of varieties under late summer sown situation becomes most important with the development of Mungbean variety Virat (IPM 205-07) of 50-55 days

duration, which is highly resistant to mungbean yellow mosaic disease, powdery mildew and has short–statured, erect and upright plants with green, ovate and entire leaves and a green stem with purple splashes. Variety Samrat (PDM -139) mature in 60-65 days is highly resistant to mungbean yellow mosaic disease and powdery mildew, grains are small in size and dull green in color and has higher yield attributes and seed yield of Mungbean in comparison to Meha (IPM 99-125) under conventional tillage during summer season. Variety Meha (IPM 99-125) matures in 60-65 days and has wider adaptability across the country. Evaluation of these varieties is essential in summer season for getting better and comparable higher yield. Spacing or optimum plant density is a pre-requisite for obtaining higher productivity, because dense plant stand will not afford desired sunlight for the process of photosynthesis and can easily assailed by diseases. Aside from very low, this population will also dwindle the yield. It is an elite pre-requisite to perpetuate the optimum plant population by sustaining inter and intra row spacing properly. Mungbean management practices and plant densities greatly affect crop growth and then finally grain yield and is a key factor in the flexibility and yielding ability of cultivars. The maximum plant stand may derogate yield of Mungbean causing corporeal development in plants. Plant density may not only be clarified in terms of the number of plants per unit area (plant density) but also in terms of positioning of plants on the ground (Crop geometry). On the other hand very low plant population will also reduce the yield. Due to this reason normal population is necessary for high yield. Advantage of optimum spacing under irrigated condition is due to reduced completion for light because when moisture is lacking, light is no longer limiting factor and the advantage of uniform spacing is lost. It is the most important non-monetary input, which can be manipulated to attain the maximum production per unit area. Accordingly, a study was planned to evaluate the performance of different green gram varieties under varying crop geometry grown in summer season.

Material and Method

The experiment was conducted in field number 8 at Students' Instructional Farm, Department of Agronomy of this University, which is situated in the alluvial tract of Indo - Gangetic plains in central part of Uttar Pradesh between 25º26' to 26º58' North latitude and 79º31' to 80º34'East longitude at an elevation of 125.9 meters from the sea level. This region falls under agro-climatic zone V (Central Plain Zone) of Uttar Pradesh. The soil of the experimental field was sandy loamy texture, organic carbon (0.62 and 0.65 %) and available nitrogen (211.20 and 213.75 kg ha^{-1}) medium available phosphorus (12.07 and 13.36 kg ha^{-1}) and available potash (250.76 and 260.72 kg ha^{-1}). Alkaline permanganate method (Subbaiha and Asija 1965), Olsen's calorimetrically method (Olsen *et al.* 1954) [10], Flame photometer method (Jackson 1967) [11], Weakley and Black method (Jackson 1973) [12] for the determination of available Nitrogen, Phosphorus, Potassium organic carbon, respectively. The pH and EC experimental site was determined through Electrometric glass electrode method (Piper 1966) and (Jackson 1967) [11]. The pH of experimental soil was 7.20, 7.19 and EC 0.318, 0.331 during both of investigation. Nine treatments combinations comparing of three crop geometry *viz.*, 15x10 cm, 22.5x10 cm and 30x10 cm and three varieties *viz.*, PDM 139, IPM 205-07 and IPM 99-125 were evaluated in split plot design with three replication by keeping varieties main plot and crop geometry sub plot. Size of gross pot was 5.5 m x 4.0 m. A fertilizer dose of 18, 46, 20 kg ha^{-1} through DAP (100 kg ha^{-1}) and muriate of potash (34 kg ha^{-1}) was given to all the treatment at the time of sowing in the furrow. All the culture practices were performed uniformly for all the treatments. Greengram varieties were dibbled on 18 April 2019 and 2020 using different seed rate as per treatments. Intercultural operations like weeding, mulching, irrigation and pest control practices. The crop was harvested at different date as par maturity of different varieties when 90% pods were matured. Observations on different growth and yield parameters were recorded from five randomly selected plants in each net plot and seed yield was recorded. Then harvested crop was properly dried in the sun before threshing. The data recorded were table and analyzed statistically using (ANOVA) technique and the treatment were compared at 5% level of significance.

Effect of varieties

An appraisal of the data presented in Table 1 indicated that periodical height of greengram plant was significantly influenced due to varieties at all growth stage. Variety IPM 99-25 registered significantly taller plant height at 25 DAS to at harvest and was followed by variety PDM 139. Significantly difference in plant height in different varieties was observed due to their genetic potential in different growth habit and not due to treatment effects. Similar result was reported by Mondal R, Sengupta K and Patel *et al.*, (2019) [4].

Growth and yield attributes of greengram were significantly influenced due to different varieties. Significantly fresh and dry matter accumulation, leaf are index were observed with variety IPM 99-125 and was followed by variety PDM 139 and significantly lowest variety IPM 205-07. Significantly higher number of branches $plant^{-1}$was observed with variety IPM 99-125 over variety IPM 205-07 and variety PDM 139. Significantly less number of days to flowering initiation, days to 50% flowering initiation and days to pod initiation were observed with variety IPM 205-07 as compared variety IPM 99-125 and PDM 139. The variety IPM 205-07 had the pod length, number of pod $plant^{-1}$, seed weight $plant^{-1}$ and test weight as compared variety IPM 99-125 and variety PDM 139. This might due to variation observed among the varieties was due to inherent characteristic of particular variety. Similar result was reported by Pratap *et al.*, (2013) [6] and Patel *et al.*, (2020) [5].

The difference in grain, straw and biological yield of summer greengram due to different varieties was found significant (Table). Variety IPM 205-07 recorded higher seed yield as compared to variety IPM 99-125 and variety PDM 139. Variety IPM 99-125 gave significantly higher straw and biological yield and followed by variety IPM 205-07 and lowest straw and biological yield was obtained with variety PDM 139. This was due to a variety difference in its genetic built up and hence resulted in the yield potential. Similar resulted reported by Sher Singh *et al.*, (2016) [7] and Patel *et al.*, (2020) [5].

An appraisal of data in the table 3 indicated that the difference in the protein content in grain due to different varieties were significant. The highest protein content in grain was recorded with variety IPM 205-07 (23.21 and 23.37) and was followed by PDM 139. Increase in protein content in grain may be due

to increased Nitrogen concentration in grain. Similar result was reported by Do Dwadiya and Sharma (2012) [3].

The appraisal of data presented in table. 5 and 6 indicated that nutrient content and uptake in grain and straw was significantly influenced by different varieties. Significantly higher NPK content and uptake in grain and straw was observed with variety IPM 205-07 and was followed by variety PDM 139 and variety IPM 99-125. Similar result was reported by Mondal R and Sengupta K (2019) [4] and Patel *et al.*, (2020) [5].

Effect of crop geometry

All growth and yield attributing parameter *viz.*, plant height, number of branches plant^{-1}, leaf area index and dry matter accumulation, pod length, number of seed pod^{-1}, seed weight plant^{-1}, and test weight were significantly influenced by different crop geometry with also days to flowering initiation, days to 50% and days to pod initiation were significantly influenced by different crop geometry. The data on plant height measured at successive stage of plant under different crop geometry was fond significant. Crop geometry 30 x 10 cm had taller plant than 22.5 x 10 cm and 15 x 10 cm possibly because of increased completion for space, sunlight and available nutrient. Similar in conformity with Patel *et al.*, (2020) [5] who attributed the increased growth rate and earlier canopy closer of narrow row spaced crops to quest for increased light interception as well as increased availability of soil moisture because of equidistant distribution of crop plant. Number of branches plant^{-1}, leaf area index, and dry matter accumulation were significantly higher under with crop geometry 30 x 10 cm as compared to crop geometry 15 x 10 cm and was followed by crop geometry 22.5 x 10 cm. The pod length, number of seed pod^{-1}, seed weight plant^{-1} and test weight were found significantly higher under crop geometry 22.5 x 10 cm and was followed by crop geometry 30 x 10 cm. Similar result was reported by Singh *et al.*, (2020) [8] and Patel *et al.*, (2020) [5].

It is evident from the results presented in Table. 2.that there were significant difference in days to flowering initiation , days to 50% flowering initiation and days to pod initiation. Crop geometry 30 x 10 cm recorded significantly minimum days to flower initiation, days to 50% flowering and days to pod initiation as compared to crop geometry 15 x 10 cm. it was at par with 22.5 x 10 cm at successive stage of crop. Maximum days to flower imitation, 50% flowering and pod imitation were registered with crop geometry of 30 x 10 cm. This might be due to lager space, maximum sunlight, higher photosynthetic rate and enzymatic activity of crop plant. This is similar to the finding of Choudhary *et al.*, (2015) [2] and Patel *et al.*, (2020) [5].

Table 1: Growth parameters of summer greengram with different varieties and crop geometry

Treatments	Plant height									Number of branches plant^{-1}			Fresh weight plant^{-1}			Dry weight plant^{-1}		
	25 DAS			50 DAS			At harvest			At harvest			At harvest			At harvest		
	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled
Variety																		
PDM 139	16.71	16.89	16.80	45.07	45.30	45.19	48.95	49.17	49.06	5.353	5.387	5.373	45.63	45.84	45.72	15.21	15.28	15.24
IPM 205-07	16.58	16.79	16.68	45.43	45.61	45.52	45.98	46.37	46.17	5.327	5.357	5.343	44.01	44.32	44.10	14.67	14.74	14.70
IPM 99-125	17.26	17.48	17.37	48.27	48.47	48.37	55.88	56.10	55.99	5.630	5.685	5.661	48.15	48.39	48.27	16.05	16.13	16.09
S.EM.±	0.052	0.036	0.048	0.179	0.212	0.255	0.255	0.272	0.293	0.052	0.013	0.036	0.293	0.272	0.288	0.054	0.067	0.64
CD at 5%	0.169	0.116	0.156	0.583	0.692	0.831	0.832	0.886	0.931	0.169	0.044	0.117	0.954	0.885	0.937	0.174	0.217	0.208
Crop geometry																		
15 cm x 10 cm	16.57	16.79	16.68	44.55	44.75	44.65	46.32	46.54	46.43	5.507	5.642	5.528	43.32	43.48	43.41	14.42	14.49	14.46
22.5 cm x 10 cm	16.95	17.15	17.05	47.04	47.25	47.15	49.54	49.92	49.73	5.730	5.760	5.748	46.30	46.53	46.42	15.43	15.51	15.47
30 cm x 10 cm	17.03	17.21	17.12	47.18	47.38	47.28	54.96	55.18	55.07	5.873	5.889	5.802	49.41	49.59	49.49	16.46	16.53	16.50
S.EM.±	0.053	0.057	0.050	0.159	0.156	0.275	0.344	0.419	0.356	0.045	0.035	0.040	0.287	0.244	0.242	0.089	0.101	0.111
CD at 5%	0.155	0.165	0.147	0.465	0.456	0.803	1.006	1.225	1.041	0.056	0.065	0.078	0.839	0.713	0.705	0.259	0.296	0.323

Table 2: Growth parameters of summer greengram with different varieties and crop geometry

Treatments	Leaf area index									Days to flowering initiation			Days to 50%flowering initiation			Days to pod initiation		
	25 DAS			50 DAS			At harvest											
	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled
Variety																		
PDM 139	0.563	0.578	0.572	3.66	3.71	3.69	4.35	4.41	4.39	28.86	28.89	28.88	35.41	35.45	35.43	39.94	40.97	40.46
IPM 205-07	0.492	0.512	0.502	3.64	3.70	3.67	3.35	3.41	3.38	28.34	28.37	28.36	33.78	33.83	33.81	38.97	38.01	38.49
IPM 99-125	0.574	0.596	0.585	3.80	3.87	3.83	4.50	4.56	4.53	30.00	30.03	30.02	36.28	36.33	36.30	42.78	42.63	42.21
S.EM.±	0.002	0.006	0.002	0.031	0.011	0.011	0.016	0.027	0.014	0.150	0.099	0.246	0.207	0.195	0.145	0.388	0.096	0.281
CD at 5%	0.007	0.019	0.006	0.101	0.036	0.035	0.052	0.088	0.046	0.490	0.321	0.800	0.673	0.637	0.472	1.265	0.313	0.914
Crop geometry																		
15 cm x 10 cm	0.414	0.428	0.422	3.55	3.52	3.53	3.33	3.39	3.36	29.86	29.89	29.87	35.67	35.72	35.69	41.27	42.21	41.74
22.5 cm x 10 cm	0.498	0.522	0.510	3.66	3.72	3.69	3.38	3.44	3.42	28.97	29.00	28.98	35.41	35.45	35.44	40.87	41.84	41.36
30 cm x 10 cm	0.717	0.737	0.727	3.78	3.85	3.81	4.48	4.54	4.51	28.38	28.40	28.40	35.23	35.27	35.25	40.55	41.56	41.05
S.EM.±	0.005	0.005	0.004	0.036	0.029	0.022	0.012	0.015	0.012	0.155	0.119	0.157	0.267	0.246	0.245	0.244	0.097	0.216
CD at 5%	0.013	0.016	0.010	0.104	0.084	0.063	0.036	0.043	0.034	0.454	0.346	0.460	0.163	0.172	0.171	0.713	0.284	0.631

Table 3: Yield parameters of summer greengram with different varieties and crop geometry

Treatments	Number of pod plant^{-1}			Number of seed pod^{-1}			Pod length (cm)			Seed weight plant^{-1} (g)			Test weight (g)			Protein content in grain		
	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled
Variety																		
PDM 139	24.55	25.59	25.07	7.63	7.75	7.70	9.60	9.71	9.65	12.15	12.30	12.23	36.89	37.82	37.20	22.68	22.83	22.76
IPM 205-07	31.63	33.04	32.28	7.90	8.01	7.96	9.65	9.75	9.70	12.38	12.50	12.45	40.97	41.46	41.22	23.21	23.37	23.29
IPM 99-125	22.95	24.02	23.49	7.36	7.45	7.41	9.49	9.60	9.54	11.23	11.38	11.31	34.56	34.89	34.72	22.41	22.58	22.50
S.EM.±	0.084	0.078	0.124	0.049	0.034	0.039	0.035	0.034	0.038	0.077	0.088	0.099	0.122	0.124	0.103	0.064	0.111	0.183
CD at 5%	0.274	0.253	0.404	0.161	0.111	0.126	0.116	0.110	0.121	0.251	0.288	0.321	0.398	0.339	0.335	0.207	0.361	0.594
Crop geometry																		
15 cm x 10 cm	24.71	26.03	25.26	7.40	7.49	7.45	8.58	8.69	8.64	11.52	11.72	11.62	35.79	36.75	36.37	21.46	21.61	21.53
22.5 cm x 10 cm	28.16	29.23	28.75	7.87	7.99	7.93	10.59	10.68	10.64	12.36	12.47	12.42	41.07	41.50	41.29	22.75	22.90	22.83
30 cm x 10 cm	26.27	27.40	26.83	7.63	7.73	7.68	9.57	9.68	9.63	11.88	11.99	11.94	40.49	41.25	40.87	24.10	24.26	24.18
S.EM.±	0.214	0.221	0.158	0.061	0.041	0.038	0.071	0.066	0.078	0.085	0.099	0.097	0.139	0.154	0.145	0.161	0.145	0.176
CD at 5%	0.623	0.647	0.461	0.177	0.120	0.112	0.208	0.192	0.227	0.248	0.289	0.285	0.405	0.450	0.423	0.471	0.424	0.514

Optimum crop geometry increases the growth of plant, which helped in getting higher grain, straw and biological yield. The grain, straw and biological yield was observed significantly maximum with crop geometry 22.5 x 10 cm followed by crop geometry 15 x 10 cm. The lower grain, straw and biological yield was obtained with crop geometry 30 x 10 cm. This might be due to optimum number of plant population and row spacing. Similar result was reported by Chaudhary *et al.,* (2015) [5] and Singh *et al.,* (2016) [9]. Crop geometry 22.5 x 10 cm registered maximum N, P and K content and its uptake. This was significantly higher over plant geometry 15 x 10 cm and followed by crop geometry 30 x 10 cm. This might be due to maximum utilization of nutrient from soil surface, optimum spaced plant density give maximum photosynthetic rate. They are utilized more nutrient compare to closer plant density. Similar result reported by Patel *et al.,* (2020) [5].

Conclusion

It can conclude that summer greengram variety IPM 205-07 was grown under with crop geometry 22.5 x 10 cm can be recommended for summer season considering the yield and profitability.

Table 4: Yield parameters of summer greengram with different varieties and crop geometry

Treatments	Grain yield (kg ha^{-1})			Straw yield (kg ha^{-1})			Biological yield (kg ha^{-1})			Harvest index (%)		
	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled
Variety												
PDM 139	1041.91	1040.81	1041.36	1898.38	1894.77	1896.58	2940.29	2935.58	2937.93	35.41	35.44	35.42
IPM 205-07	1081.01	1088.85	1084.93	1926.52	1938.20	1932.36	3007.33	3027.05	3017.29	35.94	35.97	35.95
IPM 99-125	1025.60	1036.05	1030.83	2040.26	2051.48	2045.87	3065.86	3087.53	3076.70	35.45	33.55	33.50
S.EM.±	2.29	3.58	1.20	1.92	4.40	2.33	2.63	5.42	1.98	0.058	0.094	0.045
CD at 5%	7.47	11.66	3.91	6.27	14.32	7.59	8.56	17.64	6.46	0.189	0.305	0.147
Crop geometry												
15 cm x 10 cm	1057.21	1065.28	1061.24	1990.94	1981.42	1986.18	3048.15	3046.70	3047.42	34.69	34.97	34.83
22.5 cm x 10 cm	1106.71	1105.76	1106.23	1998.33	2011.66	2005.00	3105.04	3117.41	3111.23	35.63	35.46	35.54
30 cm x 10 cm	984.60	994.68	989.64	1875.88	1891.37	1883.63	2860.48	2886.04	2873.26	34.44	34.48	34.46
S.EM.±	2.25	2.98	1.62	4.81	3.65	2.66	4.50	4.75	3.20	0.089	0.076	0.046
CD at 5%	6.57	8.69	4.73	14.03	10.65	7.78	13.13	13.88	9.33	0.261	0.221	0.135

Table 5: Nutrient content of summer greengram with different varieties and crop geometry

Treatments	Nutrient content (%)											
	N				P				K			
	Seed		Straw		Seed		Straw		Seed		Straw	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Variety												
PDM 139	3.500	1.100	3.571	1.12	1.05	0.53	1.07	0.55	0.332	0.633	0.353	0.657
IPM 205-07	3.566	1.109	3.551	1.12	1.11	0.56	1.13	0.58	0.335	0.635	0.355	0.658
IPM 99-125	3.477	1.072	3.543	1.10	1.01	0.52	1.04	0.54	0.330	0.630	0.353	0.648
S.EM.±	0.015	0.003	0.022	0.004	0.003	0.003	0.003	0.003	0.002	0.004	0.001	0.002
CD at 5%	0.048	0.009	0.020	0.014	0.011	0.009	0.010	0.011	0.003	0.004	0.005	0.003
Crop geometry												
15 x 10 cm	3.438	1.082	3.480	1.11	1.05	0.53	1.07	0.54	0.317	0.618	0.342	0.643
22.5 x 10 cm	3.638	1.122	3.638	1.14	1.07	0.55	1.09	0.56	0.348	0.647	0.368	0.668
30 x 10 cm	3.467	1.077	3.547	1.10	1.06	0.54	1.08	0.55	0.332	0.633	0.352	0.652
S.EM. ±	0.003	0.004	0.007	0.003	0.004	0.002	0.003	0.002	0.002	0.004	0.002	0.002
CD at 5%	0.009	0.012	0.022	0.009	0.003	0.004	0.008	0.006	0.004	0.011	0.006	0.005

Table 6: Nutrient uptake of summer green gram with different varieties and crop geometry

Treatments	Nutrient uptake kg/hectare											
	N				P				K			
	Seed		Straw		Seed		Seed		Straw		Seed	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Variety												
PDM 139	36.52	20.88	37.21	21.32	10.96	10.00	11.16	10.36	3.46	12.03	3.69	12.45
IPM 205-07	38.64	22.63	38.71	22.98	11.97	11.50	12.26	11.97	3.64	12.96	3.88	13.50
IPM 99-125	35.68	20.63	36.75	21.24	10.39	10.05	10.77	10.47	3.41	12.14	3.67	12.57
S.EM. ±	0.167	0.051	0.201	0.114	0.043	0.050	0.025	0.066	0.023	0.076	0.016	0.042
CD at 5%	0.544	0.165	0.653	0.372	0.142	0.162	0.081	0.215	0.075	0.249	0.052	0.136
Crop geometry												
15 x 10 cm	33.86	20.28	34.62	20.89	10.40	9.99	10.65	10.49	3.12	11.60	3.40	12.17
22.5 x 10 cm	40.31	22.43	40.26	22.86	11.78	10.89	12.47	12.17	3.87	12.92	4.09	13.44
30 x 10 cm	36.66	21.43	37.79	21.78	11.75	10.67	12.08	11.14	3.51	12.61	3.75	12.91
S.EM. ±	0.153	0.071	0.201	0.069	0.055	0.030	0.034	0.059	0.013	0.063	0.019	0.058
CD at 5%	0.446	0.209	0.587	0.202	0.160	0.089	0.099	0.172	0.039	0.183	0.056	0.169

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