RESEARCH ARTICLE

RESPONSE OF SORGHUM [*SORGHUM BICOLOR* (L.) MEONCH] GENOTYPES TO DIFFERENT FERTILITY LEVELS ON NUTRIENT UPTAKE, AVAILABLE SOIL NUTRIENTS AFTER HARVEST AND YIELDS

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Abstract: An experiment was conducted at the Instructional Farm, Rajasthan College of Agriculture, during *kharif* 2012. To study the effect of different fertility levels on nutrient uptake and nutrient status in soil nutrients after the harvest and yields of crop. Four fertility levels *i.e*. control, 50, 75 and 100% RDF (recommended dose of fertilizers; 80 kg N+40kg P_2O_5 +40kg K_2O ha^{-1}) and 6 elite sorghum genotypes (SPH 1674, SPH 1680, SPV 2083, CSH 16, CSH 25 and CSV 23) were compared in a factorial randomized block design. Maximum nitrogen uptake by grain, maximum protein uptake by grain, as well as fodder, with genotype SPH 1674. CSV 23 recorded maximum phosphorus uptake (22.66 ha^{-1}) by fodder. Results showed that application of 100 % RDF gave significantly higher grain, fodder and biological yields over 50 % and control.Significantly increased available N, P & K contents in soil after harvest the sorghum crop over control.CSV 23 and SPV 2083 recorded significantly maximum available N, P and K in soil after harvest over rest of the genotypes.SPH 1674 recorded significantly higher grain yield (61.94 q ha^{-1}) and harvest index (34.48 %) than other genotypes.

Keywords: Fertility levels, Genotypes, Nutrient uptake, Available soil after harvest, Yield

INTRODUCTION

Sorghum [*Sorghum bicolor* (L.) Munch] is the king of millets and third important crop in the country after rice and wheat. Sorghum is not only staple food but it is also required to fulfill fodder requirement in order to make animal husbandry sector more viable. There is a great need to maintain regular well balance supply of more nutritious feed and fodder in the state. The quick spreading of high yielding genotypes changed the scenario of sorghum production in India. Now at present India produces that much amount of sorghum grain that we produced just double acreage during 1950,s. These are not a dream but it was achieved only by using high yielding and fertilizer responsive cultivars of sorghum. While, the need for adequate fertilizer requirement is desirable, where as identification of suitable genotype with genetic potential is equally important. Sorghum is a highly nutrient exhaustive crop and the importance of nitrogen and phosphorus in its nutrition is well documented. Thus, suitable cultivars and proper nutrition are very important to achieve higher yield. Hence, the present study was undertaken to find out the response of different elite sorghum genotypes to fertility levels.

MATERIAL AND METHOD

A field investigation was carried out during the *kharif* 2012 at the Instructional Farm, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur which is situated at 23°34' N latitude, 73°42' E longitude and at an altitude of 582.17 meters above the mean sea level, to study the effect of various fertility levels on growth and yield of elite sorghum cultivars. The maximum and minimum temperature during sorghum crop growth period ranged between 28.1 ºC to 36.3 ºC and 15.4 ºC to 26.6 ºC, respectively. The soil of experimental site was clay loam in texture having slightly alkaline pH (8.0) in reaction, organic carbon (0.77 %), medium with respect to available nitrogen (292.50 kg ha^{-1}), available phosphorus (20.25 kg ha^{-1}) and high in available potassium (198.65 kg ha^{-1}). The experiment consisting of 24 treatment combinations comprising four fertility levels [control, 50, 75 and 100 % RDF (recommended dose of fertilizer; 80 kg N+40kg P_2O_5 +40kg K_2O ha^{-1}) and six elite sorghum genotypes (SPH 1674, SPH 1680, SPV 2083, CSH 16, CSH 25 and CSV 23) were compared in a factorial randomized block design having three replications. Sorghum genotypes were sown on 4 July, 2012 at 45x 12-15 cm row to row and plant to plant spacing with a seed rate of about 10 kg ha^{-1}.Half dose of nitrogen of each level and full doses of P_2O_5 and K_2O will be applied as basal dose at sowing and remaining half dose of nitrogen will be applied crop at 30 DAS by broadcasting through urea in standing crop. Total rainfall received during crop growing season was 642.40 mm. Crop was harvested on 15 October, 2012. For grain yield, earheads from each net plot were picked up and kept in gunny bags. After through sun drying these were threshed, winnowed and cleaned. After sun drying 2-3 days the grain weight of individual plot was recorded and final yield was expressed in kg ha^{-1}, while after detaching the earheads the fodder was left in the field for sun drying for few days. After drying, the bundles

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of each plot were weight and noted dry fodder yield per unit area. The harvest index calculated by dividing the economic yield (grain yield) by biological yield and expressed in percentage (Donald and Hamblin, 1976).

RESULT AND DISCUSSION

A perusal of data presented in Table 1 reveals that application of fertility levels significantly enhanced N uptake by grain, fodder and total uptake by crop over control. Among the fertility levels ever increase in fertility levels from 0 to 100 % RDF significantly increased N uptake by all parts i.e. grain as well as fodder and total uptake by crop except in grain where significant response was noted only up to 75 % RDF. The increased with the 100 % RDF were by 50.67, 20.42 & 5.18 per cent in grain 52.51, 19.77 & 10.80 per cent in fodder and 51.43, 20.15 and 7.46 per cent in total N uptake by crop over control, 50 and 75 % RDF, respectively.

The data presented in table 1 reveals that application of fertility levelssignificantly improved P uptake by grain, fodder and total uptake by crop over control and maximum was noted in 100 % RDF in all the parameters i.e. grain, fodder and total uptake by crop over both the lower doses i.e. 50 and 75 % RDF except P uptake by grain whereas significant response was noted only up to 75 % RDF over 50 % RDF. The increases with the 100 % RDF were to the tune of 52.51, 23.25 & 5.10 per cent in grain, 41.37, 13.11 & 8.72 per cent in fodder and 45.66, 17.08 & 7.13 per cent in total P uptake by crop over control, 50 and 75 % RDF, respectively.

A perusal of data presented in Table 1 reveals that application of fertility levelssignificantly improved K uptake by grain, fodder and total uptake by crop over control. Among the levels of fertility significantly maximum was noted with the application of 100 % RDF in all the parameters i.e. grain, fodder and total uptake by crop over both the lower doses i.e. 50 and 75 % RDF except K uptake by grain whereas significant response was noted only up to 75 % RDF over 50 % RDF. The increases with the 100 % RDF were to the tune of 57.34, 25.90 & 6.03 per cent in grain, 45.84, 18.70 & 12.03 per cent in fodder and 47.10, 19.51 & 11.29 per cent in total K uptake by crop over control, 50 and 75 % RDF, respectively.

The total uptake ofN,P and K by sorghum was increased significantly due to fertilizer application. The maximum uptake ofN (167.27 kg ha^{-1}), P (40.72 kg ha^{-1}) and K (259.69 kg ha^{-1}) at harvest recorded with application of 100% RDF. It is an established fact that accumulation of nutrients is dependent on their concentration at cellular level and dry matter production. Thus, impact of N,P and K fertilizer on their ultimately led to higher accumulation of nutrients by plant parts along with total uptake by the crop. Application of fertility levelssignificantly enhanced proteinuptake by grain since the protein content is computed from nitrogen content of grain which has enhanced under the above said treatments because of increased availability of soil nitrogen. Result with the findings of Das *et al*. (2000), Kaushik (2000), Jat*et al*. (2003), Sumeriya *et al*. (2005), Dixit *et al*. (2005), Dhaker (2010) and Sumeriya (2010).

A perusal of data presented in Table 1 reveals that application of fertility levelssignificantly enhanced proteinuptake by grain, fodder and total uptake by crop over control. Among the fertility levels protein uptake by grain was significantly responded up to 75 % RDF over 50 % RDF but further, increase in fertility from 75 % to 100 % RDF failed to increase protein uptake by grain. Whereas in case of protein uptake in fodder and total uptake by the crop, ever increase in fertility from 0 to 100 % RDF obtained significantly higher protein uptake. The increases with the 100 % RDF were to the tune of 52.51, 19.78 and 10.81 protein in fodder, 51.37, 20.15 and 7.46 per cent in total uptake over control, 50 and 75 % RDF, respectively.

Application of fertility levelssignificantly enhanced proteinuptake by grain since the protein content is computed from nitrogen content of grain which has enhanced under the above said treatments because of increased availability of soil nitrogen. An increase in protein content as a consequence of nitrogen, phosphorous and potassium fertilization is in agreement with the findings of Das *et al*. (2000), Kaushik (2000), Jat*et al*. (2003), Sumeriya *et al*. (2005), Dixit *et al*. (2005), Dhaker (2010) and Sumeriya (2010).

A perusal of data presented in Table 2 reveals that application of fertility levels significantly increased available N, P & K contents in soil after harvest the sorghum crop over control. While, among the levels, 100 % RDF provided significantly maximum N, P &K content over 50 % RDF but 75 % RDF was at par with higher as well as lower i.e. 100 & 50 % RDF in all nutrients content in soil.

The status of availability of N in the soil after harvesting of sorghum was lower than the initial status of the soil under all the treatments due to the fact that sorghum crop is a heavy feeder ofN. At higher doses of nitrogen, phosphorus and potassium the crop growth was also better than their lower doses. So naturally more uptake of nitrogen took place under these treatments. However, the available status of phosphorus and potassium in soil at harvest was observed with increasing fertility levels might be due to build up of nutrients in soil as a result of addition ofN,Pand K. Besides, on addition of fertilizer P to the soils, there might be some sort of triggering action on native soil P resulting in increased availability. Vaidya and Gabhane (1998) and Patil and Varade (1998) also reported an increase in nutrient availability after harvest of sorghum with increasing rate of fertilizer application.

It can be inferred from data presented in Table 3 that application of fertility levels significantly increased the grain, dry fodder and biological yields over no fertility (control). Among the levels of fertility significant response was noted this application of 75 % RDF in grain production over 50 % RDF while, further increased in fertility from 75 to 100 % RDF was failed to show any significant response in grain yield. The increases with 75 % RDF were to the tune of 38.62 and 14.55 per cent over control and 50 % RDF.

But in case of dry fodder and biological yield application of 100 % RDF provided significantly maximum yields over both the lower doses. While, application of 75 % RDF also proved significantly superior over 50 % RDF in both dry fodder and biological yields. The increases with the 100 % RDF were by 34.80, 12.14 & 8.27 per cent in dry fodder and 37.55, 14.21 & 6.98 per cent in biological yield over control, 50 & 75 % RDF, respectively.

The significant increases in fodder yield with increasing fertility levels could be attributed to conducive effect on root and shoot growth of the plant which in turn has accrued from increased plant height and dry matter accumulation. The correlation studies also substantiate significant positive relationship between fodder yields. The profound influence of fertilizer on biological yield seems to be an account of its influence on vegetative and reproductive aspects of crop growth. The results of present investigation are in close agreement with the findings of Kushwaha and Thakur (2006), Singh and Sumeriya (2006) Dhaker (2010), Panwar*et al.* (2014) and Panwar*et al.* (2015).

A perusal of data presented in Table 3 reveals that application of fertility levels significantly improved the harvest index. While, all the levels of fertility did not prove their superiority with one another in this respect.

A perusal of data presented in Table 3 indicates that application of 100 % RDF provided significantly higher gross, net returns and B/ C ratio over all the lower doses whereas ever increase in fertility 0 to 100 % RDF increased the gross and monetary returns. But in case of B/ C ratio response was obtained only upto 75 % RDF. The increases with 100 % RDF were to the tune of 41.59, 17.23 and 5.23 per cent in gross and 50.77, 20.26 and 5.53 per cent net returns over control, 50, and 75 % RDF, respectively.

The increasing levels of fertility increased the gross and net returns (Table 3) up to 75 % RDF however, variation between 75 % RDF was found at par with 100 % RDF. Similar observation was also made by Singh and Sumeriya (2006), Dhaker (2010) and Kumawat (2013) on maize crop.

Further, data presented in Table 1 indicated that SPH1674 recorded significantly maximumnitrogen uptake by grain and total uptake by the crop over rest of the genotypes. GenotypeSPV 2083 and CSV 23 were estimated significantly minimum in N uptake and remaining were at par in both these parameters. But in case of fodder, variety CSV 23 provided significantly maximum Nuptake over rest of the genotypes except SPV 2083 which was at par. Remainings were statistically at par in this parameter.

An examination of data presented in Table 1 reveals that SPH1674 recorded significantly maximumphosphorus uptake by grain over rest of the genotypes. Whereas, genotypesCSV 23 and SPV 2083 produced significantly minimum P uptake by grain, remains were at par with one another SPH 1674 provided 13.97 & 14.94 per cent higher P uptake over CSH 16 and CSH 25,respectively.Further, data reveals that CSV 23 recorded maximumphosphorus uptake (22.66 kg ha^{-1}) by fodderwhich was remained at par withSPV 2083 and significantly superior over rest of the genotypes. Remaining genotypes were also noted at par with one another.However, SPH1674 recorded maximum total potassium uptake by cropsignificantly superior over rest of the genotypes.While, both the varieties were statistically poorer in this respect. Genotype SPH1674 produced 6.75, 14.81, 7.62, 6.21 and 12.97per cent higher total potassium uptake by cropover SPH1674,SPV 2083, CSH 16,CSH25 and CSV 23**,** respectively.

An examination of data presented in Table 1 reveals that SPH1674 recorded significantly maximum potassiumuptake by grain over rest of the genotypes. GenotypeSPH 1674 produced 11.57, 63.76, 6.91, 8.56 and 63.67 per cent higherpotassium uptake by grainoverSPH 1680, SPV 2083,CSH 16, CSH25 and CSV 23,respectively. Whereas, both the varieties i.e. SPV 2083 and CSV 23 were noted significantly poorer over rest of the genotypes in this respect.However, CSV 23 provided maximum potassium uptake by fodder (209.68 kg ha^{-1}) which was remained at parwithSPV 2083 and both were statistically superior over rest of the genotypes.In case of total K uptake by crop all the genotypes were failed to show any significant response with one another.

Nutrients (N,P and K) uptake increased with genotypes. As the uptake is a product of the yield and nutrient content, considerable increase in either of components may increase the uptake. The uptake of nutrients is mainly governed by the variation in grain and stover yield and their nutrient concentrations. Genotypic variation in uptake by grain, stover and total uptake of nitrogen, phosphorusand potassium by crop was significantly affected due to genotypes. However, comparing different genotypes for N, P and K nutrients, genotype SPH 1674 recorded highest N and P uptake by grain and total uptake by crop. While, obtained highest N and P instover and total K uptake by the crop in CSV 23. The improvement in protein content of grain of variety SPH 1674 seems to be on account of increased N concentration in grain. It is well known fact that N is a constituent of protein, enzymes and chlorophyll and participates in several biochemical processes for the metabolism of carbohydrate and protein system. Thus higher protein might be on account of higher N content compared to other varieties. Genetic variability in sorghum with respect to plant nutrients uptake ofN,P and K were also observed by Dixit *et al*. (2005), Sumeriya *et al*. (2005), Dhaker (2010), Sumeriya (2010) and Mawaliya (2012).

The analytical data in Table 1 indicated that SPH1674 recorded significantly maximumprotein uptake in grainover rest of the genotypes. GenotypeSPV 2083 and CSV 23 provided significantly minimum protein uptake and responses were at par with another in this contrast. Genotypes SPH 1674 provided 11.17 and 12.09 per cent high protein uptake by grain over CSH 16 and CSH 25. In case of dry fodder significantly maximum protein uptake was obtained by test variety CSV 23 except SPV 2083 which was at par. Remains were also at par with one another. Further, data showed that genotypes SPH 1674 estimated significantly maximum total uptake by the crop whereas both the varieties i.e. SPV 2083 and CSV 23 were significantly poorer in this respect. Remains were at par with one another. The increased with SPH 1674 were by 8.52 and 8.16 per cent proved over CSH 16 and CSH 25, respectively.

The improvement in protein content of grain of variety SPH 1674 seems to be on account of increased N concentration in grain. It is well known fact that N is a constituent of protein, enzymes and chlorophyll and participates in several biochemical processes for the metabolism of carbohydrate and protein system. Thus higher protein might be on account of higher N content compared to other varieties. Result with the findings of Dixit *et al*. (2005), Sumeriya *et al*. (2005), Dhaker (2010), Sumeriya (2010) and Mawaliya (2012).

An examination of data presented in Table 2 reveals that CSV 23 recorded significantly maximum available nitrogen in soil after harvest over rest of the genotypes. GenotypeCSV 23 produced9.79, 5.52, 3.17, 4.76 and 3.27per cent maximumavailable nitrogen in soil after harvest overSPH1674, SPH 1680, SPV 2083,CSH 16 andCSH25,respectively. This was followed by SPV 2083 and CSH 25 which were proved significantly superior over SPH 1674.Further, data showed that CSV 23 recorded maximumavailable phosphorus in soil after harvestwhich was remained at par withSPV 2083, CSH 16andCSH25 and all these genotypes brought about significant inference over rest of the genotypes.

Whereas, SPV 2083 obtainedmaximumavailable potassium in soil after harvestwhich was remained at par withCSV 23 and significantly superior over rest of the genotypes.While, genotype CSV 23 noted significantly superior over SPH 1674 and at par with rest of the genotypes tested.

The status of available nitrogen, phosphorus and potassium in soil after harvesting of sorghum was lower than the initial status of soil under all the treatments due to the fact that sorghum crop is a heavy feeder of nitrogen, phosphorus and potassium. Sorghum genotypes CSV 23 left maximum amount of nitrogen, phosphorous and potassium (269.27, 21.36 and 357.97 kg $ha.^{-1}$) and SPH 1674 left minimum amount of nitrogen, phosphorous and potassium (245.24, 19.02 and 347.65 kg $ha.^{-1}$) to be soil after harvest the sorghum crop.

A critical examination of data in Table 3 reveals that SPH 1674 recorded significantly maximum grain yield (61.94 q ha^{-1})over rest of the genotypes. Genotype SPH 1674 produced 8.90, 9.74 and 55.71 per cent higher grain yield over CSH 16, CSH 25 and CSV 23,respectively. Further, SPH 1680 proved statistically at par with test hybrid CSH 16 and CSH 25. All these were brought about significant response over genotype SPV 2083 and CSV 23 in grain production.

But in case of dry fodder yield variety CSV 23 provided maximum dry fodder which was statistically at par with genotype SPV 2083 and both these genotypes were obtained analytically higher dry fodder yield over rest of the genotypes tested. The increases with CSV 23 and SPV 2083 were to the tune of 14.67 & 11.38 per cent over CSH 16 and 13.23 & 9.97 per cent over CSH 25, respectively.

In case of biological yield all the genotypes were failed to show any significant response with one another.

The higher grain and fodder yield registered by SPH 1674 and CSV 23 over rest of the genotypes appear to be a resultant of remarkable improvement in different yield components, which was brought about due to adoption of genotypes. It was further, confirmed by the fact that seed yield was found strongly correlated with different yield components. Such close association ship of grain yield with different yield components was also observed by Kumar *et al.* (2008), Sumeriya and Singh (2008), Dhaker (2010) and Mawliya (2012). Chandravanshi, *et al,* (2014) and Thiruna *et al.* (2014)

An examination of data reveals that genotypes SPH 1674 recorded significantly maximum harvest indexover rest of the genotypes. Genotypes SPH 1680,CSH 16 and CSH 25 were proved second best in harvest index and all were significantly superior over SPV 2083 and CSV 23. The increases with genotypes SPH 1674 were by 4.93, 6.55 and 50.57 percent over CSH 16, CSH 25 and CSV 23, respectively.

It can be inferred from the data presented in Table 3 reveals that SPH 1674 recorded significantly maximum gross and net returns as well as B/ C ratio over rest of the genotypes. Genotypes CSH 16, SPH 1680 and CSH 25 were found second best and provided significantly higher gross, net return and B/ C ratio over both the varieties i.e. CSV 23 and SPV

2083 and proved statistically at par with one another in all these parameters. The increases with genotype SPH 1674 were to the magnitude of 8.80, 32.72, 7.06, 7.34 and 31.86 per cent ingross 11.85, 47.69, 9.46, 9.84 and 46.30 per cent in net returns and 12.20, 49.07, 9.15, 9.89 and 47.71 percent in B/ C ratio over SPH 1680, SPV 2083, CSH 16, CSH 25 and CSV 23**,** respectively.

It is obvious because grain yield increased with the increase in the fertility levels in proportion to cost of cultivation hence the gross returns and net returns. Similar observation was also made by Singh and Sumeriya (2006), Dhaker (2010) and Kumawat (2013) on maize and Singh *et al*., 2014 sorghum crop.

Table 1. Response of sorghum genotypes to different fertility levels on nutrient uptake and protein yield

Treatments	Nutrient uptake(kg ha^{-1})									Protein yield (kg ha^{-1})		
	Nitrogen			Phosphorous			Potassium					
	Grain	Fodder	Total	Grain	Fodder	Total	Grain	Fodder	Total	Grain	Fodder	Total
Fertility levels (%RDF)												
0	64.66	45.80	110.46	11.11	16.85	27.96	19.34	157.20	176.54	404.11	286.26	690.37
50	80.90	58.32	139.22	13.72	21.06	34.78	24.17	193.14	217.30	505.64	364.48	870.12
75	92.62	63.04	155.66	16.09	21.91	38.01	28.70	204.64	233.34	578.86	393.99	972.85
100	97.42	69.85	167.27	16.91	23.82	40.72	30.43	229.26	259.69	608.86	436.58	1045.44
SEm±	1.74	1.05	2.04	0.31	0.37	0.50	0.51	3.58	3.61	10.89	6.59	12.78
CD (P=0.05)	4.96	3.00	5.82	0.88	1.06	1.41	1.46	10.20	10.27	31.00	18.75	36.37
Genotypes												
SPH 1674	105.41	58.50	163.92	17.70	20.45	38.14	30.95	193.77	224.71	658.84	365.64	1024.48
SPH 1680	90.55	56.73	147.27	15.77	19.96	35.73	27.74	188.65	216.39	565.91	354.53	920.44
SPV 2083	59.30	62.29	121.59	11.25	21.96	33.22	18.90	202.22	221.12	370.64	389.32	759.96
CSH 16	94.83	56.22	151.04	15.53	19.92	35.44	28.95	189.61	218.56	592.66	351.35	944.01
CSH 25	94.04	57.50	151.55	15.40	20.51	35.91	28.51	192.42	220.93	587.77	359.39	947.16
CSV 23	59.26	64.28	123.54	11.09	22.66	33.76	18.91	209.68	228.60	370.39	401.74	772.13
SEm±	2.13	1.29	2.50	0.38	0.46	0.61	0.63	4.39	4.42	13.34	8.07	15.65
CD (P=0.05)	6.07	3.68	7.13	1.08	1.30	1.73	1.78	12.49	NS	37.97	22.97	44.55

NS= Non significant

Table 2. Response of sorghum genotypes to different Fertility levels on available nutrient status of soil after harvest.

Treatment	N in soil (kg ha^{-1})	P in soil (kg ha^{-1})	K in soil (kg ha^{-1})
Fertility levels (% RDF)			
0	248.69	19.28	338.83
50	257.55	20.17	351.25
75	260.86	20.55	354.14
100	265.18	21.09	367.67
SEm±	1.92	0.23	2.45
CD (P=0.05)	5.46	0.65	6.98
Genotypes			

SPH1674	245.24	19.02	347.65
SPH1680	255.16	19.12	349.49
SPV2083	260.98	20.98	361.57
CSH16	257.03	20.60	350.21
CSH25	260.73	20.56	350.94
CSV23	269.27	21.36	357.97
SEm$\pm$	2.35	0.28	3.00
CD (P=0.05)	6.69	0.80	8.55

Table 3. Response of sorghum genotypes to different fertility levels on yield (kg ha^{-1}), harvest index, gross, net returns and B/C ratio.

Treatment	Yield (kg ha^{-1})			Harvest index (%)	Gross returns (` ha^{-1})	Net returns (` ha^{-1})	B/ C Ratio
	Grain	Fodder	Biological				
Fertility levels (% RDF)							
0	4112	10134	14246	28.53	57839	40539	2.34
50	4976	12182	17158	28.88	69859	50824	2.67
75	57.00	12618	18318	31.13	77820	57917	2.91
100	5935	13661	19596	30.53	81893	61122	2.94
SEm$\pm$	099	215	236	0.52	1046	1046	0.05
CD (P=0.05)	281	613	672	1.48	2978	2978	0.15
Genotypes							
SPH 1674	6194	11792	17986	34.48	81395	62143	3.22
SPH 1680	5580	11522	17102	32.68	74814	55561	2.87
SPV 2083	4001	12922	16922	23.32	61328	42076	2.16
CSH 16	5688	11602	17291	32.86	76026	56773	2.95
CSH 25	5644	11750	17394	32.36	75827	56574	2.93
CSV 23	3978	13304	17282	22.90	61727	42475	2.18
SEm$\pm$	121	264	289	0.64	1281	1281	0.06
CD (P=0.05)	344	751	NS	1.82	3647	3647	0.18

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