Hkkjrh; df"k vuqla/kku if=dk] **35**(3): 128-134 DOI: 10.18805/BKAP236

[kjhQ l;kt dh of)] inkokj vkj x.koÙkk ij flfyd,u dh feêh vkj i.k vkonu d çHkko ij v/;;u

:ikyh oh- Hkxkj*[1] ,o 'kjn ,- f'kn[2]

lykV fQft;ky,t h foHkkx] cukjl fgn fo'ofo|ky;] df"k foKku lLFkku] okjk.klh&221 005] ;-ih] Hkkjr A

ikIr% flrEcj 2020 Lohdr% vDrwcj 2020

lkjk'k

Þfeêh d ik"kd rRo dh miyC/krk] mBko] mit vkj [kjhQ l;kt dh x.koÙkk ij flfyd,u d çHkko vkj feêh d Qkfy;j vuç;kx dk {k= ç;kxß [kjhQ 2016 & 2017 d nkjku Lukrdkuj egkfo|ky; d vul/kku Qke] egkRek Qy —".k fo|kihB] jkgjh e ,d –'; d lkFk vk;kftr fd;k x;k FkkA [kjhQ l;kt dh of)] mit vkj x.koÙkk ij flfyd,u d Lrjk d çHkko dk v/;;u dju d fy,A tkp dk ;k–fPNd Cy,d fMtkbu ¼vkjchMh½ e fd;k x;k] pkng mipkj l;ktu e dfY'k;e flfydV d rhu Lrjk ¼50] 100½ d feêh d vkonu 'kkfey FkA 150 fdxk g &1 vkj Qkfyd Lç d ek/;e l flfyfdd ,flM ¼,l,½ 1] 2 vkj 3 ihih,e dh rhu lkærkA nk mipkj i.k fu;=.k vkj GRDF dh ryuk 0 kg Si ha^{-1} l dh xb FkhA xnu dh ekVkb] Hke/;j[kh; 0;kl] /koh; 0;kl vkj] cYck dh dy mit vkj l;kt dh ivky dh mit nt dh xbA jklk;fud x.k vFkkr ih,p] blh vkj vklh u flfyd,u d vkonu d dkj.k dkQh çHkkfor fn[kk;kA mipkj d ekey e T_{14} u cgrj ih,p] blh vkj vklh ¼Øe'k% 8-35] 0-54 vkj 0-60½ nt fd;kA mipkj T_{14} u lcl vf/kd /koh; 0;kl ¼5-55 leh½] Hke/;j[kh; 0;kl ¼5-94 leh½] xnu dh ekVkb ¼0-88 leh½ mPpre otu çfr cYc ¼83-50 xke½] cYc dh mit ¼37-50 t ha^{-1}½ vkj ivky dh mit ¼2-40 q ha^{-1}½ Øe'k% nt dhA ;g fu"d"k fudyk x;k g fd feêh dh mojrk dk cuk, j[ku] Qly dh of) dk c<ku vkj mFkyh feêh ij l;kt d pfj= dk ;kxnku vkj mit c<ku d fy, mipkj ¼T_{14}½ dk ykHkdkjh ik;k x;kA

'kCn dth% mit] Qly] x.koÙkk] ik"kd rRok l Hkjij] flfyd,u Mkbv,Dlkb MA

Bhartiya Krishi Anushandhan Patrika, **35**(3): 128-134

Study on effect of soil and foliar application of silicon on growth, yield and quality on *kharif* onion (*allium cepa* l.)

Rupali V. Bhangare*[1] and Sharad S. Shinde[2]

Department of Plant Physiology, Banaras Hindu University, Institute of Agril. Sciences, Varanasi-221 005(U.P.) India

Received: September 2020 Accepted: October 2020

ABSTRACT

The field experiment entitled "Effect of soil and foliar application of silicon on soil nutrient availability, uptake, yield and quality of *kharif* onion" was conducted during *kharif* 2016 – 2017 at Post Graduate Institute research farm, Mahatma Phule Krishi Vidyapeeth, Rahuri with a view to study the effect of levels of silicon on growth, yield, and quality of *kharif* onion.The investigation was carried out in Randomized Block Design (RBD), fourteen treatments combinations comprised of soil application of three levels of calcium silicate (50, 100 and 150 kg Si ha^{-1}) and three concentration of silicic acid (SA) 1, 2, and 3 ppm through foliar spray. Two treatments absolute control and GRDF were taken for comparison having 0 kg Si ha^{-1}. The neck thickness, equatorial diameter, polar diameter and, total yield of bulbs and straw yield of onion were recorded. The chemical properties viz. pH, EC and OC showed significantly influenced due to application of

*Corresponding author's E-mail: ratna.prabha@icar.gov.in

[1]lykV fQft;ky,t h foHkkx] cukjl fgn fo'ofo|ky;] ,xhy foKku lLFkkuA foKku] okjk.klh &221005 ¼;-ih-½ Hkkjr]

[2]enk foKku vkj —f"k foHkkxA jk;u foKku] Lukrdkuj lLFku] MPKV] jkgjh&413 722] egkjk"V] Hkkjr

[1]Department of Plant Physiology, Banaras Hindu University, Institute of Agril. Sciences, Varanasi-221005, (U.P.) India.

[2]M.Sc. Agri., Department of Soil Science & Agril. Chemistry, Post Graduate Institute, MPKV, Rahuri- 413 722, Maharashtra, India,

silicon. In case of treatment T_{14} recorded significantly superior pH, EC and OC (8.35, 0.54 and 0.60 % respectively). The treatment T_{14} recorded significantly highest polar diameter (5.55cm), equatorial diameter (5.94cm), neck thickness (0.88 cm) highest weight per bulb (83.50 g), bulb yield (37.50 t ha^{-1}) and straw yield (2.40 q ha^{-1}) respectively. It is concluded that treatment (T_{14}) was found beneficial for maintaining soil fertility, for enhance crop growth and for increase yield and yield contributing character of onion on shallow soil.

Key words: Growth, Yield, Quality, Nutrient Uptake, Silicon dioxide etc.

iLrkouk

flfyd,u (Si½ ,d nljk lcl çpj rRo g] ;k rk otu vkj ijek.kvk dh l[;k d vk/kkj ij iFoh dh iiMh e ç—fr e v,Dlhtu d lkFk lh dh etcr vkReh;rk d dkj.k lh ge'kk ,d flfyd k ¼SiO_2 flfyd,u Mkbv,DlkbM½ ;k flfydVl d :i e ekt n gA flfyd,u Mkbv,DlkbM e iFoh dh ijr dk yxHkx 60% 'kkfey gA feêh e flfyd,u Mkbv,DlkbM 50% l vf/kd flfyd,u ,dkxrk d fy, [kkrk gA enk ?kkyr e 3-5 feyhxke vkj 40 feyhxke lh çfr yhVj flfyfdd ,flM ¼ek'kuj 1995½ d :i e gkrk gA

gkykfd de ?kyu'kh yrk ¼fyMl 1979½ dh otg l iFoh dh iiMh e lh çpj ek=k e g] db feêh e vi;klr vkifr gkrh g ;k ik/k miyC/k lh e LokHkkfod :i l de gkr gA lh dk vorj.k ikjifjd enkvk e gk ldrk g ftle fujrj ekukdYpj] Qly k dh mPp mit nu okyh [krh dh xgu [krh vkj fVdkÅ Qly mRiknu d fy, ,d lhfer dkjd gk ldrk gA flfyd,u fdlh Hkh lyyj ?kVdk dk ,d ?kVd ugh cukrk g] yfdu e[; :i l ,fiMfel vkj loguh Årdk dh nhokjk ij tek gkrk g tk dhVk vkj jkxk d fy, 'kfä] dBkjrk vkj çfrjk/k dk çfrfuf/kRo djr gA flfyd,u ik"k.k db vtfod rukok dk çc/ku Hkh djrk g ftue vkokl] l[kk] fofdj.k] mPp rkieku] BM vkj jklk;fud ruko tl ued] /kkr fo'kä rk vkj ik"kd vlryu ¼,iLVhu 1994½ 'kkfey gA

l;kt ¼Allium cepa L.½ ifjokj d vrxr vkrk g Alliaceae 0;kid :i l lCth vkj elkyk d chp lcl egRoi.k Qly d :i e mi;kx fd;k tkrk gA Hkkjr e] l;kt cM ieku ij if'peh] mÙkjh vkj nf{k.kh Hkkxk e jch vkj [kjhQ nkuk ek lek e mxk;k tkrk gA Hkkjr l;kt&yky] lQn vkj ihy rhuk fdLek dk mRiknu djrk gA pkoy dh inkokj] chekjh vkj dhV çfrjk/k c<ku e lh ,d cgr egRoi.k Hkfedk fuHkkrk gA blfy,] ;g ijh{k.k Qly d :i e l;kt d fy, lh ik"k.k d igy dk v/;;u dju dk fu.k; fy;kA bl n[kr g, oreku tkp dk mí';

flfyd,u d fofHkUu Lon'kh lkrk ¼Mk;Vke; l vFk] dfYl;e flfydV] cxkl ,'k½ vkj lh d Lrj dk eY;kdu djuk g tkl;kt dh Qly dh mit] l;kt d cYck dh x.koÙkk dk çHkkfor djr gA

lkexh ,o ijh{k.k fof/k

Hkkxkfyd :i l ikLV xt ,V bLVhVîV] egkRek Qy —f"k fo|kihB dk Qke] jkgjh 19°47'N l 19°57'N v{kk'k vkj 74°18' l 74°19' b n'kkrjk d chp fLFkr gA 455 ehVj l Åij leæ ry dk eryc gA ;g {k= if'peh ?kkVk d ioh fgLl e fLFkr g vkj detkj {k= d vrxr vkrk gA çk;kfxd Hk[kM dh feêh dk v,Mj ,fVlky d rgr oxh—r fd;k x;k gA feêh mFkyh FkhA feêh dh cukoV jrhyh feêh dh nkeV Fkh ftle ih,p ¼8-02½ ç—fr e FkkMk {kkjh; FkkA feêh dh fo|r pkydrk lkekU; Fkh ¼0-45 dSm^{-1}½A miyC/k ukbVktu e de ¼195-47 kg ha^{-1}½] miyC/k Q,LQkjl e mPp ¼24-12 kg ha^{-1}½ vkj miyC/k ikVf'k;e ¼288 kg ha^{-1}½ e mPpA miyC/k flfyd,u ¼68-88 mg kg^{-1}½ FkkA ykg e flok; l{e ik"kd rRok dh dkb deh ugh n[kh xb tk feêh e deh Fkh ¼3-94 ihih,e½A çR;d Hk[kM l ikp igkfM;k dk crjrhc <x l puk x;k FkkA p;fur igkfM;k dk [kV dk Bhd djd fpfàr fd;k x;k FkkA bu igkfM;k ij lHkh ik/kk dh of) voykdu nt fd, x, FkA oreku ç;kx l feêh] ik/k vkj dhV vkj jkx dh ?kVukvk d voykdu d ckn mRiUu vkdMk dk lkf[;dh; :i l iku vkj l[ker ¼1985½ }kjk l>k, x, rjhdk l fo'y"k.k fd;k x;k FkkA

ifj.kke ,o foopuk

Qly e feêh d jklk;fud x.kk ij flfyd,u d Lrj dk çHkko% {k= ç;kx d rgr [kjhQ l;kt dh Qly e lkrk d çHkko] flfyd,u d Lrj vkj feêh dh lifÙk;k ij mudh ckrphr d vkdMk dk fuEufyf[kr rkfydk 2 e çLrr fd;k x;k gA

ih,p% rkfydk 2 e çLrr Qly e feêh d ih,p ij flfyd,u d Lrj d lc/k e MVkA flfyd,u d Lrj u feêh d ih,p dk dkQh c<k fn;k gA dfY'k;e flfydV

d lh yoy dk vuç;kx @ 150 kg ha^{-1} vkj 3 ppm SA mipkj dk Lç T_{14} dk NkMdj lHkh mipkjk ij mPpre pH ¼8-35½ nt fd;k x;kA T_9(8.29), T_{10} (8.29), T_{11} (8.30), T_{12}8-32½ vkj T_{13} ¼8]34½ tk T_{14} d cjkcj FkA vkdMk u ldr fn;k fd flfyd,u d mPp Lrj ¼50 fdykxke l vf/kd ha^{-1}½ e Qly e feêh d ih,p e ekeyh of) gb FkhA flfyd,u d Lrj e of) d lkFk feêh d ih,p e ekeyh of) gb FkhA ;g l;kt dh Qly dh ue fLFkfr d rgr gku oky fo|r ifjoruk d dkj.k gk ldrk gA ;g Hkh ey tM fodkl d dkj.k gk ldrk g tk CO_2 dh egRoi.k ek=k d mRiknu dh vkj tkrk g vkj Qly d fy, feêh d ih,p dk c<ku d fy, gYd dkcfud vEyk dh fjgkb gkrh gA ;g fi'ky vkj g;j ¼2013½ vkj nxM ,V vy ¼2014½ d fu"d"kk d lkFk le>krk FkkA A

fo|r pkydrk% rkfydk 2 e çLrr Qly e feêh blh ij flfyd,u d Lrj d çHkko d lc/k e MVkA flfyd,u d Lrj u blh dk dkQh çHkkfor fd;kA vU; lHkh mipkjk d edkcy dfY'k;e d flfydV d lh yoy dk vkonu @150kgha^{-1} vkj 3 ihih,e ,l, Lç dk dkQh mPpre blh ¼0-54 dSm^{-1}½ nt fd;k x;kA flfyd,u dh ek=k d lkFk feêh dh fo|r pkydrk dk FkkMk c<k;k x;kA ue feêh d rgr feêh vkj flfyd,u lkrk l ?kyu'khy yo.k d fo?kVu e ifjoru'khyrkA ogk feêh d ?kky dh vk;fud lkærk c<k nhA blh dh of) d lc/k e blh rjg d fu"d"kk dk fipy vkj gk;j ¼2013½ vkj nxM ,V vy ¼2014½ }kjk lh lkrk d mi;kx d dkj.k lfpr fd;k x;k FkkA

dkcfud dkcu% rkfydk 2 e çLrr Qly e feêh OC ij flfyd,u d Lrj d lc/k e MVkA flfyd,u d Lrj e dkQh of) gb OCA dfY'k;e flfydV d Si yoy dk vuç;kx @150kgha^{-1} vkj 3 ppm SA Lç v,Q VhVeV T_{14} T_{12} ¼0-58%½ vkj T_{13} ¼0-59%½ dk NkMdj lHkh mipkjk ij] lcl vf/kd OC (0-60%) nt fd;k] tks o;j e T_{14} d cjkcjA çkIr ifj.kke fi'ky vkj gk;j ¼2013½ d ifj.kkek d vu:i g] ftUgku feêh e flfyd,u lkexh vkj dkcfud dkcu d chp xj&egRoi.k lglc/k dh lpuk nh FkhA

inkokj vkj Qly e [kjhQ l;kt dh inkokj d dkj.k mit ij flfydu d Lrj dk iHkko

/koh; 0;kl% flfydu 'kk d mi;kx d dkj.k cYc dk /koh; 0;kl dkQh çHkkfor ik;k x;kA Vcy 3- dfY'k;e flfydV dk Lrj @150kgha^{-1} vkj 3 ihih,e ,l, Lç mipkj dk Lç T_{14} lcl vf/kd /koh; 0;kl ¼5-55 leh½ nt fd;k x;k] lHkh mipkjk ij T_{13} ¼5-4 leh½ dk NkMdj] tk T_{14} d cjkcj FkA tkMk x;k flfyd,u d ykHkdkjh çHkko d dkj.k /koh; 0;kl dkQh c< x;k FkkA vf/kd vkdkj çkIr dju dfy, ftEenkj lyyj Lrj ij flfyd,u d ly fMohtu c<ko] foLrkj vkj c;ku e of)A [kktu d leku ekeyk dk Hkh nxkn ,V vy ¼2014½ }kjk fjkV fd;k x;k FkkA

rkfydk 1% mipkj fooj.k

mipkj	mipkj fooj.k		
	GRDF	dfY'k;e flfydV dk enk vuç;kx (Ca_2SiO_4 kg ha^{-1})	i.k Lç ¼nk ckj½ d ek/;e l ,l, dh ,dkxrk
T_1	-	i.k fu;=.k	
T_2	GRDF	-	-
T_3	GRDF	50	0 ppm (Water spray)
T_4	GRDF	50	1 ppm
T_5	GRDF	50	2 ppm
T_6	GRDF	50	3 ppm
T_7	GRDF	100	0 ppm (Water spray)
T_8	GRDF	100	1 ppm
T_9	GRDF	100	2 ppm
T_{10}	GRDF	100	3 ppm
T_{11}	GRDF	150	0 ppm (Water spray)
T_{12}	GRDF	150	1 ppm
T_{13}	GRDF	150	2 ppm
T_{14}	GRDF	150	3 ppm

,l, & flfyfdd ,flM

ukV% GRDF: 100% 50% 50 kg ha^{-1} N, P_2O_5 vkj K_2O + 20 Mt ha^{-1} FYM Øe'k% vkj i.k vuç;kx dk le;% jkikb d ckn 553 vkj 55 fnuk d ckn flfydk ,flM d nk i.k LçA

rkfydk 2% enk jklk;fud x.k ¼ih,p] blh vkj vklh½ mipkjk l çHkkfor gkr gA

Tr. No.	mipkj	pH(1:2.5)	EC(dSm^{-1})	Org. C (%)
T_1	i.k fu;=.k	8.00	0.40	0.50
T_2	GRDF	8.05	0.43	0.51
T_3	GRDF + CS 50 kg ha^{-1} + 0 ppm SA	8.05	0.46	0.54
T_4	GRDF + CS 50 kg ha^{-1} + 1 ppm SA	8.13	0.47	0.55
T_5	GRDF + CS 50 kg ha^{-1} + 2 ppm SA	8.16	0.48	0.55
T_6	GRDF + CS 50 kg ha^{-1} + 3 ppm SA	8.15	0.50	0.56
T_7	GRDF + CS 100 kg ha^{-1} + 0 ppm SA	8.23	0.49	0.56
T_8	GRDF + CS 100 kg ha^{-1} + 1 ppm SA	8.26	0.49	0.57
T_9	GRDF + CS 100 kg ha^{-1} + 2 ppm SA	8.29	0.50	0.58
T_{10}	GRDF + CS 100 kg ha^{-1} + 3 ppm SA	8.29	0.51	0.58
T_{11}	GRDF + CS 150 kg ha^{-1} + 0 ppm SA	8.30	0.49	0.56
T_{12}	GRDF + CS 150 kg ha^{-1} + 1 ppm SA	8.32	0.51	0.58
T_{13}	GRDF + CS 150 kg ha^{-1} + 2 ppm SA	8.34	0.52	0.59
T_{14}	GRDF + CS 150 kg ha^{-1} + 3 ppm SA	8.35	0.54	0.60
SE+	0.02	0.005	0.004	
CD at 5%	0.07	0.01	0.013	
Initial	8.01	0.45	0.63	

lh,l & dfY'k;e flfydV] ,l, & flfyfdd ,flM] blh& byfDVdy dUDVfDVfoVh] vklh&v,xfud dkcu

Hke/;j[kh; 0;kl% cYc d Hke/;j[kh; 0;kl dk flfydu 'kk Vcy 3 d vuç;kx }kjk dkQh c<k fn;k x;k FkkA fo"kor 0;kl dfY'k;e flfydV d Lrj e dkQh vf/kd Fkk @150kg ha^{-1} vkj 3 ihih,e ,l, mipkj dk Lç T_{14} ¼5-94 leh½] lHkh mipkjk ij T_9 ¼5-77 leh½] T_{10} ¼5-77 leh½] T_{11} ¼5-92 leh½] T_{12} ¼5-91 leh½ vkj T_{13} ¼5-79 leh½ dk NkMdj] tk T_{14} d cjkcj FkA bDoVkfj;y 0;kl flfyd,u d vkonu d lkFk dkQh c< x;k FkkA ;g feêh l ik"kd rRok dh vkifr vkj vfrfjä flfyd,u d ykHkdkjh çHkko d dkj.k gkrk gA ly vkdkj e of)] lyyj Lrj ij flfyd,u d foLrkj vkj c;ku d fy, vkj vf/kd vkdkj cuku d fy, lh dh HkfedkA blh rjg d ifj.kke nxM ,V vy ¼2014½ }kjk Hkh fjikV fd, x, Fk A

xnu dh ekVkb% flfyd,u Vcy d vuç;kx Lrjk d dkj.k cYc dh xnu dh ekVkb dkQh çHkkfor fn[kkb nhA flfyd,u d vkonu d dkj.k xnu dh ekVkb dkQh çHkkfor gbA T_{12} ¼0-85 leh½ vkj T_{13} ¼0-85 leh½ dk NkMdj] lHkh mipkjk d edkcy dfY'k;e flfydV dk Lrj @150kg ha^{-1} vkj 3 ihih,e ,l, Lç d mipkj e T_{14} dkQh xnu dh ekVkb ¼0-88 leh½ nt dh xb] tk cjkcj Fk T_{14}A flfyd,u lkr d ek/;e l fodkl pj.kk e Qlyk dk ik"kd rRok dh miyC/krk u xnu dh ekVkb e of) dh gA nxM ,V vy ¼2014½ }kjk fjikV fd, x, l;kt cYc dh xnu dh ekVkb ij flfyd,u d lkrk vkj Lrjk d çHkko d fy, leku ifj.kkeA

[kjhQ l;kt dh dVkb d le; mit ij flfyd,u dk çHkko

cYc dk vklr otu% çfr cYc dk vklr otu flfyd,u rkfydk d vuç;kx Lrjk d dkj.k egRoi.k çHkko fn[kkrk gA flfyd,u d vkonu d dkj.k çfr cYc dk vklr otu dkQh çHkkfor gvk FkkA mipkj d T_{14} ¼82g½ dk NkMdj lHkh mipkjk ij T_{14} d vykok dfY'k;e flfydV dk Lrj @150kg ha^{-1} vkj 3 ihih,e Lç bykt T_{14} ¼83-50 xke½ dk vklr mPpre otu nt fd;k x;k] tk T_{14} d cjkcj FkkA

mit% rkfydk 4 vkj fp= 1 e çLrr l;kt d cYck dh mit ij flfyd,u d Lrj d çHkko d lc/k e MVkA flfyd,u d vkonu d dkj.k l;kt dh mit dkQh çHkkfor gbA T_{14} ¼36.00 t ha^{-1}½] T_{12} ¼36.50 t ha^{-1}) dk NkMdj lHkh mipkjk ij T_{14} d dfY'k;e flfydV dk Lrj @150kg ha^{-1} vkj 3 ihih,eA VhVeV dk dkQh vf/kd mRiknu ¼37-50 t ha^{-1}½ nt fd;k x;kA vkj T_{13} ¼36-60 t ha^{-1}½] tk T_{14} d cjkcj FkA l;= e flfyd,u d lp;u bldh mifLFkfr d lkFk&lkFk dhV vkj jkx dh ?kVukvk dk de fd;kA ;,d lkFk fld dh vkj çdk'k l'y"k.k d d'ky vuokn d lkFk ;fXer gA vrr% QyLo:i vf/kd cYc dh inkokj gbA ;Si @150kg ha^{-1} d vkonu d lkFk l;kt d cYc dh vf/kd mit dk dkj.k gk ldrk gA ;urht dkjMkQj ,V vy ¼2001½] flg ,V vy ¼2005½ vkj nxn ,V vy ¼2014½ }kjk fjikV fd, x, fu"d"kk l feyr tyr FkA

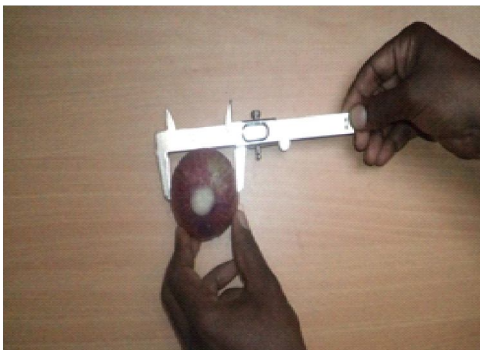
rkfydk 3% fofHkUu mipkjksa ls çHkkfor ekudksa d :i e ik=k dk mit nuk

Tr. No.	mipkj	/koh; 0;kl ¼lseh½	Hke/;j[kh; 0;kl ¼lseh½	xnu dh ekVkb
T_1	i.k fu;=.k	4.62	4.30	0.69
T_2	GRDF	4.86	4.91	0.71
T_3	GRDF + CS 50 kg ha^{-1} + 0 ppm SA	5.06	5.06	0.72
T_4	GRDF + CS 50 kg ha^{-1} + 1 ppm SA	5.06	5.06	0.75
T_5	GRDF + CS 50 kg ha^{-1} + 2 ppm SA	5.10	5.36	0.75
T_6	GRDF + CS 50 kg ha^{-1} + 3 ppm SA	5.25	5.64	0.77
T_7	GRDF + CS 100 kg ha^{-1} + 0 ppm SA	5.26	5.54	0.78
T_8	GRDF + CS 100 kg ha^{-1} + 1 ppm SA	5.28	5.63	0.77
T_9	GRDF + CS 100 kg ha^{-1} + 2 ppm SA	5.37	5.77	0.79
T_{10}	GRDF + CS 100 kg ha^{-1} + 3 ppm SA	5.42	5.77	0.80
T_{11}	GRDF + CS 150 kg ha^{-1} + 0 ppm SA	5.30	5.92	0.81
T_{12}	GRDF + CS 150 kg ha^{-1} + 1 ppm SA	5.30	5.91	0.85
T_{13}	GRDF + CS 150 kg ha^{-1} + 2 ppm SA	5.40	5.79	0.85
T_{14}	GRDF + CS 150 kg ha^{-1} + 3 ppm SA	5.55	5.94	0.88
	SE+	0.04	0.09	0.01
	CD at 5%	0.11	0.28	0.03

lh,l & dfY'k;e flfydV] ,l, & flfyfdd ,flM

/koh; 0;kl

xnu dk 0;kl



Hke/;j[kh; 0;kl

Qly dkVu oky

lyV 1% [kjhQ l;kt dh dVkb d le; mit ij flfyd,u dk çHkkoA

ivky dh mit% rkfydk 4 e çLrr l;kt dh ivky dh mit ij flfyd,u d Lrj d çHkko d lc/k e MVkA flfyd,u d vkonu d dkj.k ivky dh mit dkQh çHkkfor ikb xbA vU; lHkh mipkjk d edkcy dfY'k;e flfydV dk Lrj @150kg ha^{-1} vkj 3 ihih,e ,l, Lç gA T_{14} e lcl T;knk ivky dh inkokj ½2-40 qha^{-1}½ nt dh xbA Si dh otg l ifÙk;k dk vf/kd lh/kk cukdj Qly dh fLFkfr e l/kkj fd;k x;k] ftll çdk'k l'y"kd xfrfof/k e of) gb vkj i;klr çdk'k l'y"k.k dk l{ke dju d fy, ik/k dk l{ke fd;k tk ldkA lykV e flfyd,u d lp; l ik/k dh of) d lkFk&lkFk ik/k dh l[kh ckr Hkh c< tkrh gA ; fu"d"k dkjuM,Q ,V vy }kjk leku gA ½2001½] flg ,V vy ½2005½ vkj nxkn ,V vy ½2014½A

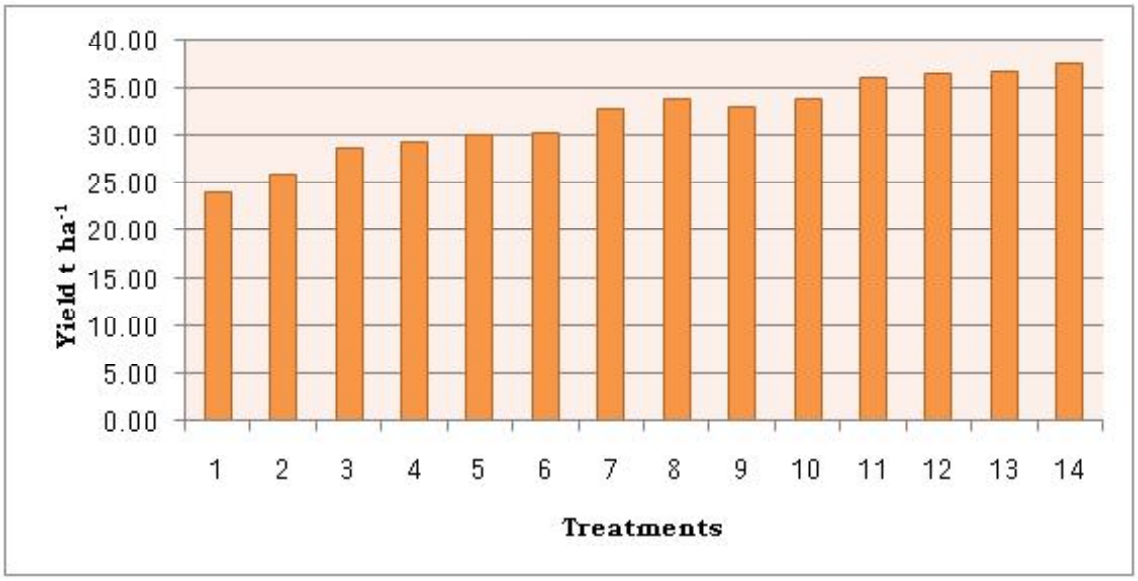
fu"d"k

l;kt dh fo'k"krkvk d dkj.k mitA flfyd,u d vkonu d dkj.k /koh; 0;kl] Hke/;j[kh; 0;kl] xnu dh ekVkb] cYc dh dy mit vkj vklr otu e dkQh of) gb FkhA mipkj d T_{14} e dfY'k;e flfydV dk Lrj @150kg ha^{-1} vkj 3 ihih,eA Lç vR;f/kd egRoi.k nt fd;k x;kA ;g fu"d"k fudkyk x;k g fd thvkjMh,Q ½100% 50% 50 fdyk gDV;j &1½ d lkFk 3 ihih,e ,l,

rkfydk 4% fofHkUu mipkjk l çHkkfor l;kt dh mitA

Tr. No.	mipkj	Av. cYc dk otu (g)	cYc dh mit (t ha^{-1})	ivky dh mit (q ha^{-1})
T_1	i.k fu;=.k	61.10	24.00	1.13
T_2	GRDF	67.10	26.00	1.45
T_3	GRDF + CS 50 kg ha^{-1} + 0 ppm SA	68.90	28.50	1.70
T_4	GRDF + CS 50 kg ha^{-1} + 1 ppm SA	69.75	29.25	1.72
T_5	GRDF + CS 50 kg ha^{-1} + 2 ppm SA	70.70	30.10	1.76
T_6	GRDF + CS 50 kg ha^{-1} + 3 ppm SA	71.50	30.20	1.80
T_7	GRDF + CS 100 kg ha^{-1} + 0 ppm SA	74.10	32.70	1.83
T_8	GRDF + CS 100 kg ha^{-1} + 1 ppm SA	75.00	33.80	1.85
T_9	GRDF + CS 100 kg ha^{-1} + 2 ppm SA	75.00	33.00	1.87
T_{10}	GRDF + CS 100 kg ha^{-1} + 3 ppm SA	77.10	33.85	1.91
T_{11}	GRDF + CS 150 kg ha^{-1} + 0 ppm SA	78.50	36.00	1.96
T_{12}	GRDF + CS 150 kg ha^{-1} + 1 ppm SA	80.00	36.50	2.00
T_{13}	GRDF + CS 150 kg ha^{-1} + 2 ppm SA	82.00	36.60	2.11
T_{14}	GRDF + CS 150 kg ha^{-1} + 3 ppm SA	83.50	37.50	2.40
	SE+	0.65	0.72	0.05
	CD at 5%	1.99	2.19	0.17

lh,l & dfY'k;e flfydV] ,l, & flfyfdd ,flM



fp= 1% fofHkUu mipkjk l çHkkfor l;kt dh mitA

d 150 xke ,p &1 nk i.k Lç dk dfY'k;e flfydV dk vkonu feêh dh mojrk dk cuk, j[ku d fy, Qk;nen ekuk tkrk g] fodkl dk c<ku d fy, vkj mFky feêh ij l;kt dh of) vkj mit ;kxnku d fy, mitA

vkHkkj

ge bl ikWfyfi d iujh{k.k e mud mnkj ekxn'ku d fy, çk- vkjch uthjdj dk bekunkjh l Lohdkj djr gA bl dke dk —f"k jlk;u foKku vkj enk foKku foHkkx] LukrdkÙkj lLFkku vul/kku Qke] egkRek Qy —f"k fo|kihB] jkgjh] egkjk"V] Hkkjr d vunku l leFku feykA

lnHk

Anon (1997) Soluble silicates and their applications. *Crossfield Publication*, Crossfield,Warrington, UK, Issue No. 2.

Chapaman, H.D. and Pratt, P.P. (1961) Methods of analysis for soil, plant and water, Division of Agriculture Science. California University, USA, pp. 309.

Durgude, A.G., Pharande, A.L., Kadlag, A.D., Kadam, S.R. and Patil, A.A. (2014) Silicon nutrition on onion, *book-novel innovation and strategies for boosting production and productivity in agriculture*. Editor Ratan Kumar Rao. 217-224.

Kadlag, A.D., Durgude, A.G., Pharande, A.L., Kadam, S.R., Kale, S.D. and Todmal, S.M. (2014) Silicon nutrition on onion, *book-novel innovation and strategies for boosting production and productivity in agriculture*. Editor Ratan Kumar Rao. 369-371

Lewin, J. and Reimann, B.E.F. (1969) Silicon and plant growth. *Annonomous. Review of Plant Physiology*. **20**, 289-304.

Ma, J.F., Miyake, Y. and Takahashi, E. (2001) Silicon as a beneficial element for crop plants. In: Silicon in Agriculture. Ed. *Elsevier Science*, Amsterdam. 17-39.

Mali, M. and Aery, N.C. (2008) Influence of silicon on growth, relative water contents and uptake of silicon, calcium and potassium in wheat grown in nutrient solution. *Journal of Plant Nutrition*. **31**(11), 1867-1876.

Miyake, Y. (1993) Silica in soils and plants. *Science of Research. Faculty Okayanam Univ*ersity. **81**, 61–79.

Nayar, P.K., Misra, A.K. and Patnaik, S. (1977) Evaluation of silica - supplying power of soils for growing rice. *Plant Soil.* **47**, 487-494.

Panse, V.G. and Sukhatme, P.V. (1985) Statistical methods for Agricultural Workers, ICAR, New Delhi, pp. 347

Pawar, R.B. and Hegde, B.A. (1979) Effect of silicon foliar application on growth, tillering and photosynthetic efficiency in *Oryza sativa var. Satiya. Indian Journal of Plant Physiology. **21**(1), 12-16.*

Phonde, D.B., Zende, N.A., Mali, V.S., Ghogake, P.V., Pawar, B.H., Yadav, R.G., Vasekar, V.S.and Undre, B.V. (2009) Response of sugarcane to levels and sources of silicon in medium deep black soils. Silicon research project in Vasantdada Sugar Institute, Pune.

Pinchel and Hayer (2013) A review of silicon and its benefits for plant, pp.34-38.

Prakash, N.B., Chandrashekar, N., Mahendra, C., Patil, S.U., Thippeshappa, G.N. and Laane, H.M. (2011) Effect of foliar spray of soluble silicic acid on growth and yield parameters of wetland rice in hilly and coastal zone soils of Karnataka, South India. *Journal Plant Nutrition.* **34,** 1883-1893.

Prakash, N.B., Narayanswami, C. and Hanumantharaju, T.H. (2010) Effect of calcium silicate as a silicon source on growth and yield of rice in different acid soils of Karnataka, Southern India *IRRN*. (0117-4185).

Rani, A.Y. and Narayanan, A. (1994) Role of silicon in plant growth. *Agro. Annul. Rev. Plant Physiol.* (B & A) **1**, 243-262.

Rani, Y.A., Narayanan, A., Devi, V. and Subbaramanian, P. (1997) the effect of silicon application on growth and yield of rice plants. *Annual Plant Physiology*. **11**(2), 125-128.

Singh, A.K., Singh, R. and Singh, K. (2005a) Growth, yield and economics of rice (*Oryza sativa*) as influenced by level and time of silicon application. *Indian Journal of Agronomy.* **50**(3), 190-193.

Singh, K.K. and Singh, K. (2005) Effect of N and Si on growth, yields attribute and yield of rice in alfisols. *IRRN*. **12**, 40 - 41.