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Short communication

Enfluence of intercropping vegetables with winter harvested plant cane for enhanced productivity of subsequent ratoon in sub-tropical India

SN Singh, SC Singh, GK Singh, RK Singh and ML Sharma

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In the recent past, the land use patterns have been changed substantially by the peasantry owing to demand of market driven remunerative crops, returns per rupee invested in area and time and technical feasibility in adoption. Consumption of vegetables is increasing at a faster rate, being protective food for human nutrition. Their cultivation is of utmost importance to the growers of north India because it offers tremendous potential of higher income per unit area and time. Cultivation of vegetables either alone or intercropped with an initially slow growing widely spaced crop like sugarcane fetch high return of combined economic yield and is fast becoming the obvious choice of resource rich farmers. Among different cropping systems, intercropping of potato with autumn sugarcane in northern India has shown tremendous potentiality in enhancing the overall productivity of the system.

SN Singh, GK Singh, RK Singh
Indian Institute of Sugarcane Research,
Lucknow-226002 (U.P.)

SC Singh, ML Sharma
U. P. Council of Sugarcane Research,
Shahjahanpur-242001 (U.P.)

The poor bud sprouting in winter initiated ratoon sugarcane results into gappy fields and contributes to low cane yield. Some of the high sugar early maturing cane varieties could not become popular mainly because of this reason. Winter initiated ratoon sugarcane offers ample scope to cope up the losses and increase the return as it can boost total economic yield of the system. Intercropping of these winter vegetables including spices may also be tried in ratoon started in winter as these intercrops have exhibited positive impact on sprouting of stubble buds under low temperature conditions. This may help minimizing gaps in ratoon, reducing cost on gap filling and obtaining remunerative prices of marketable vegetables in mid of the season. Keeping above points in to consideration, the present experiment was conceptualized to explore if vegetables' intercropping could improve ratoonability and become an economical preposition with ratoon sugarcane.

With an objective of finding out the effect of intercropping vegetables (potato and onion) and spices in between 90 cm spaced two stubble rows of December harvested sugarcane crop on ratooning ability, field experiments were conducted at the research farm of U. P. Council of Sugarcane Research, Shahjahanpur during 1999-00, 2000-01 and 2001-02. The soil of experimental field was clay loam in texture, neutral in reaction (pH 7.8), low available N (183.5 kg/ha), medium in available P (17.2 kg/ha) and K (253kg/ha). The plant crop of sugarcane (CoSe 92423) was harvested in the first week of December and four intercrops of vegetables and spices as given in Table- 1 were taken immediately after preparatory tillage in between stubble rows of sugarcane. The above intercropping treatments including December and February started ratoons as sole for comparison were laid out in randomized block design with four replications. The ratoon crop was fertilized with 180 kg N/ha (1/3rd at planting as basal dressing and 2/3rd in

Table 1: Details of variety, row arrangement, date of sowing /harvesting, seed rate and fertilizer application for different intercrops 1999-00, 2000-01 and 2001-02.

Sl. No	Intercropped vegetables / spices	Test variety	No. of row	Date of sowing	Date of harvesting	Plant to Plant distance (cm)	See rate (kg/ ha)	Fertilizer (kg/ha)		
								N	P	K
1.	Potato	Kufri Badshah	Two	08-12 December	20-24 March	20	2200	160	80	80
2.	Onion	Kalayanpur lal gol	Four	December	May	15	6 (for nursery)	100	40	80
3.	Garlic	Jaunpuri	Five	December	April	12	320	100	40	80
4.	Coriander	Pant Dhanian-1	Two	April	April	10	10	80	40	40

two equal splits as top dressings after harvesting of intercrops at proper soil moisture) and 60 kg/ha each P & K (full as basal dressing). The fertilizer doses to intercrops were given half of the total N + full doses of P and K at their respective sowing/ planting times and remaining half of the N was top-dressed after 30-35 days of sowing as per Table 1. The observations on number of mother shoots, tillers, millable canes alongwith yield of cane and intercrops were recorded at their respective growth and harvesting stages. Cane juice samples were drawn in the first week of December and analyzed for brix and sucrose contents as per procedure mentioned by Spencer and Mead (1955). The data on growth and yield of three year experimentation were pooled and analyzed for statistically to test their significance. Economics of different treatments was worked out on the basis of prevailing market prices of cane and intercrops.

The pooled over experimental data of three years presented in Table 2 clearly indicated that the intercropping of vegetables (potato and onion) and spice (garlic) in between two stubble rows of December harvested sugarcane plant crop had positive influence in recording significantly higher number of mother shoots, shoots, millable canes and ratoon cane yield under low temperature conditions during December and January over the treatments consisting of December started ratoon (sole), December harvested plant crop + ratoon management in February and December started ratoon +coriander. The above treatment of December started ratoon + potato produced the highest ratoon cane yield of 73.83 t/ha although was 1.99%, 2.37% and 4.13% higher than that of December started ratoon + onion, December started ratoon + garlic and February started ratoon (sole) treatments, respectively, however, these were statistically at par among themselves with the former. The treatments of December started (sole), December harvested plant cane + ratoon management in February and December started ratoon + coriander were observed the low ratoon cane yielder in the study and thus, produced 27.75%, 23.67% and 13.57% less yield as compared to December started ratoon + potato. The highest ratoon cane yield obtained under the treatment of December started ratoon + potato may be due to

Table-2: Effect of intercropping vegetables and spices on rationing ability of winter harvested plant cane pooled over data of 1999-2002

Treatment	Number of mother shoots (000/ha)	Number of shoot (000/ha)	Number of millable cane (000/ha)	Yield of intercrops (q/ha)	Yield of ratoon cane (t/ha)	Cane sugar content (%)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C ratio
T_1	48	135	84	-	57.83	11.22	23500	54999	31439	1.30
T_2	55	158	87	-	59.74	11.35	23000	56758	38753	1.40
T_3	59	169	101	-	7088	11.23	23500	67289	45789	1.80
T_4	69	177	105	128.12	73.53	11.18	30000	121887	91887	2.10
T_5	60	164	103	12.73	72.13	11.40	31150	94084	62634	1.99
T_6	63	167	104	113.69	72.47	11.12	34000	103034	69034	2.00
T_7	54	153	95	6.17	65.61	11.31	30000	80270	50270	1.61
C. D.(0.05)	9.75	24.33	2.46		8.24	NS				

T_1- December started ratoon (sole), T_2 December harvested plant cane + ratoon management in February
T_3- February started ratoon (sole), T_4- December started ratoon + potato)
T_5- December started ratoon +garlic, T6- December started ratoon + onion
T_7- December started ratoon + coriander

higher level of moisture and nutrients which were applied to potato as intercrop must have enhanced the physiological activity of the bud to stimulate sprouting by regulating soil temperature and soluble nitrogen content of the buds. Verma and Yadav (1988) have also reported the similar findings. Ratoon yield obtained under December started ratoon + onion and December started Ratoon + garlic treatments which were at par with the ratoon yield obtained from February started and December started ratoon +potato treatments might be due to the reasons as given in ratoon + potato intercropping system. Intercrop of coriander did not produce similar results because initial bud sprouting was suppressed later in tillering phase due to prolonged competition of coriander and ratoon plants.

Economics calculated for different treatments indicated that the treatment of December started ratoon + potato exhibited the highest B: C ratio of 2.11 followed by December started ratoon +onion (2.03), December started ratoon +garlic (1.99) as against the lowest of 1.33 under December started ratoon (sole). Sugar content in cane did not affect significantly due to different treatments in the study.

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