

**Table 3: Effect of soil and foliar application with some natural materials on vegetative growth characters and photosynthetic pigments of snap bean plants during 2012 and 2013 seasons**

Characters Treatments	Plant height (cm)		No. of leaves /plant		No. of branches /plant		Total dry weight (g/plant)		Photosynthetic pigments(mg/g) fresh weight							
	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	Chlorophyll a		Chlorophyll b		Total chlorophyll		Carotenoides	
	season	season	season	season	season	season	season	season	season	season	season	season	season	season	season	season
<b>Soil application</b>																
<b>Without</b>	30.15	31.44	10.05	11.17	3.60	3.50	6.04	6.28	0.778	0.732	0.505	0.476	1.283	1.207	0.380	0.358
<b>AMF</b>	35.70	37.84	11.90	13.44	4.26	4.21	7.13	7.52	0.921	0.881	0.598	0.572	1.519	1.453	0.450	0.431
<b>Yeast</b>	35.02	38.60	11.67	13.71	4.18	4.29	7.01	7.67	0.903	0.899	0.587	0.584	1.490	1.483	0.441	0.439
<b>AMF+Yeast</b>	36.24	38.71	12.08	13.75	4.33	4.30	7.28	8.00	0.935	0.901	0.607	0.586	1.542	1.486	0.457	0.440
<b>LSD at 5%</b>	0.41	1.31	0.14	0.47	0.05	0.15	0.10	0.04	0.011	0.031	0.007	0.019	0.017	0.047	0.05	0.15
<b>Foliar application</b>																
<b>Without</b>	30.97	34.45	10.32	12.24	3.70	3.83	6.09	6.69	0.799	0.802	0.519	0.521	1.318	1.323	0.390	0.392
<b>Pig. (10g/l)</b>	38.08	40.47	12.69	14.38	4.55	4.50	7.78	8.27	0.982	0.942	0.638	0.612	1.621	1.554	0.480	0.461
<b>Comp. (10g/l)</b>	32.19	34.09	10.73	12.11	3.84	3.79	6.35	6.87	0.830	0.794	0.540	0.516	1.370	1.309	0.406	0.388
<b>HA. (3 cm/l)</b>	36.03	38.07	12.01	13.52	4.30	4.23	7.30	7.75	0.929	0.886	0.604	0.576	1.533	1.462	0.454	0.433
<b>EM (3cm/l)</b>	34.13	36.14	11.38	12.84	4.08	4.02	6.80	7.25	0.880	0.841	0.572	0.547	1.452	1.388	0.430	0.411
<b>LSD at 5%</b>	0.33	1.24	0.11	0.44	0.04	0.14	0.12	0.05	0.008	0.029	0.005	0.020	0.014	0.050	0.04	0.14

AMF: Arbuscular mycorrhizal Fungi  
Effective microorganisms

Pig: Pigeon manure tea

Comp.: Compost tea

HA: Humic acid

EM:

Characters Treatments	Pods length (cm)	No. of pods /plant	Average pod weight (g)	Yield /plot (kg)	Total yield /fed. (ton)	Yield increase over control (%)
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**Table 6: Effect of interaction between soil and foliar application with some natural materials on yield and its components of snap bean plants during 2012 and 2013 seasons**

Soil application	Foliar application	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>
		season	season	season	season	season	season	season	season	season	season	season	season
Without	Without	10.57	10.24	15.81	15.13	3.05	3.19	7.242	7.257	2.897	2.907	00.00	00.00
	Pig. (10g/l)	11.10	11.07	16.60	16.36	3.21	3.46	7.994	8.481	3.197	3.390	10.35	16.52
	Comp.(10g/l)	10.63	10.39	15.92	15.34	3.07	3.24	7.333	7.465	2.933	2.987	1.25	2.75
	HA. (3 cm/l)	11.06	10.95	16.54	16.18	3.19	3.42	7.932	8.298	3.170	3.320	9.425	14.21
	EM (3cm/l)	10.93	10.73	16.36	15.85	3.16	3.35	7.755	7.973	3.100	3.190	7.01	9.74
AMF	Without	11.37	11.39	17.02	16.82	3.29	3.56	8.398	8.974	3.360	3.590	15.98	23.50
	Pig. (10g/l)	14.56	14.50	16.73	15.56	4.21	4.53	10.568	10.54	4.227	4.217	45.90	45.06
	Comp.(10g/l)	11.93	11.96	17.84	17.67	3.45	3.73	9.224	9.900	3.690	3.957	27.37	36.12
	HA. (3 cm/l)	13.66	13.51	18.03	17.27	3.69	4.03	9.970	10.43	3.987	4.173	37.62	43.55
	EM (3cm/l)	12.76	12.90	16.23	16.05	3.95	4.21	9.608	10.14	3.843	4.057	32.65	39.56
Yeast	Without	11.22	13.66	16.80	13.94	3.24	4.26	8.168	8.750	3.267	3.500	12.77	20.40
	Pig. (10g/l)	14.26	14.39	17.28	16.22	4.12	4.49	10.695	10.93	4.277	4.373	47.64	50.43
	Comp.(10g/l)	11.70	11.75	17.50	17.36	3.38	3.67	8.875	9.559	3.553	3.823	22.64	31.51
	HA. (3 cm/l)	13.35	13.20	18.67	18.55	3.62	3.92	10.142	10.90	4.070	4.363	40.49	50.09
	EM (3cm/l)	12.52	12.56	16.68	15.52	3.86	4.12	9.659	9.601	3.863	3.840	33.34	32.09
AMF + Yeast	Without	11.44	11.52	17.09	17.01	3.31	3.59	8.485	9.170	3.397	3.667	17.26	26.14
	Pig. (10g/l)	14.93	15.02	16.82	16.46	4.32	4.69	10.891	11.56	4.357	4.627	50.40	59.17
	Comp.(10g/l)	12.10	12.21	18.10	18.04	3.50	3.81	9.504	10.32	3.803	4.127	31.27	41.97
	HA. (3 cm/l)	13.82	14.05	18.59	18.25	3.75	4.04	10.450	11.05	4.180	4.420	44.29	52.05
	EM (3cm/l)	12.96	12.92	16.50	16.62	3.99	4.39	9.884	10.93	3.957	4.373	36.59	50.43
<b>L.S.D at 5%</b>		0.24	0.84	1.24	1.73	0.08	0.28	0.724	0.952	0.292	0.382	-	-
AMF: Arbuscular mycorrhizal Fungi			Pig: Pigeon manure tea				Comp.: Compost tea			HA: Humic acid			
EM: Effective microorganisms													





Table 13. Some correlation coefficient between yield and its components of snap bean plants during 2012 and 2013 seasons

		Season 2013			Season 2012			Characters	
		3	2	1	3	2	1		
* = Significant		1.000**	0.835**	0.537**	1.000**	0.928**	0.549**	Total yield (ton/fed.)	Y
		0.536*	-0.013 <sup>NS</sup>		0.546**	0.198 <sup>NS</sup>		No. of pods/plant	1
		0.836**			0.929**			Average pod weight (g)	2
								Green pods yield (kg/plot)	3

NS= Not significant  
\*\*= Highly significant

**Table 4: Effect of interaction between soil and foliar application with some natural materials on vegetative growth characters and photosynthetic pigments of snap bean plants during 2012 and 2013 seasons**

Characters		plant height (cm)		No. of leaves /plant		No. of branches /plant		Total dry weight (g/plant)		Photosynthetic pigments(mg/g) fresh weight								
		1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	Chlorophyll a		Chlorophyll b		Total chlorophyll		Carotenoides		
Treatments	Soil application	Foliar application	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season
Without	Without		29.35	30.16	9.78	10.71	3.50	3.35	5.78	5.92	0.757	0.702	0.492	0.456	1.249	1.158	0.370	0.343
	Pig. (10g/l)		30.82	32.60	10.27	11.58	3.68	3.62	6.24	6.63	0.795	0.759	0.517	0.493	1.311	1.252	0.389	0.371
	Comp. (10g/l)		29.53	30.59	9.84	10.86	3.53	3.40	5.92	6.03	0.761	0.712	0.495	0.463	1.256	1.175	0.372	0.348
	HA. (3 cm/l)		30.71	32.25	10.24	11.45	3.67	3.59	6.12	6.56	0.792	0.751	0.515	0.488	1.307	1.238	0.387	0.367
	EM (3cm/l)		30.36	31.59	10.12	11.22	3.63	3.51	6.13	6.25	0.783	0.735	0.509	0.478	1.292	1.213	0.383	0.359
AMF	Without		31.58	33.52	10.53	11.91	3.77	3.73	6.18	6.50	0.815	0.780	0.529	0.507	1.344	1.287	0.398	0.381
	Pig. (10g/l)		40.45	42.69	13.48	15.16	4.83	4.75	8.26	8.68	1.043	0.994	0.678	0.646	1.721	1.639	0.510	0.486
	Comp. (10g/l)		33.12	35.23	11.04	12.51	3.95	3.92	6.43	6.84	0.854	0.820	0.555	0.533	1.409	1.353	0.418	0.401
	HA. (3 cm/l)		37.94	39.79	12.65	14.13	4.53	4.42	7.75	8.07	0.978	0.926	0.636	0.602	1.614	1.528	0.478	0.453
	EM (3cm/l)		35.42	37.97	11.81	13.49	4.23	4.22	7.02	7.51	0.914	0.884	0.594	0.574	1.507	1.458	0.447	0.432
Yeast	Without		31.17	40.21	10.39	14.28	3.72	4.47	6.10	7.03	0.804	0.936	0.522	0.608	1.326	1.544	0.393	0.458
	Pig. (10g/l)		39.61	42.38	13.20	15.05	4.73	4.71	8.14	8.70	1.022	0.986	0.664	0.641	1.685	1.628	0.499	0.482
	Comp. (10g/l)		32.49	34.61	10.83	12.29	3.88	3.85	6.41	7.13	0.838	0.806	0.545	0.524	1.383	1.329	0.410	0.394
	HA. (3 cm/l)		37.06	38.86	12.35	13.80	4.43	4.32	7.52	7.95	0.956	0.905	0.621	0.588	1.577	1.492	0.467	0.442
	EM (3cm/l)		34.76	36.97	11.59	13.13	4.15	4.11	6.86	7.54	0.896	0.860	0.583	0.559	1.479	1.420	0.438	0.421
AMF + Yeast	Without		31.76	33.91	10.59	12.04	3.79	3.77	6.29	7.30	0.819	0.789	0.532	0.513	1.351	1.302	0.400	0.386
	Pig. (10g/l)		41.46	44.23	13.82	15.71	4.95	4.92	8.47	9.09	1.069	1.030	0.695	0.669	1.764	1.699	0.523	0.503
	Comp. (10g/l)		33.61	35.96	11.20	12.77	4.01	4.00	6.65	7.49	0.867	0.837	0.563	0.544	1.430	1.381	0.424	0.409
	HA. (3 cm/l)		38.39	41.37	12.80	14.69	4.58	4.60	7.79	8.43	0.990	0.963	0.644	0.626	1.634	1.589	0.484	0.471
	EM (3cm/l)		35.98	38.05	11.99	13.51	4.30	4.23	7.18	7.68	0.928	0.886	0.603	0.576	1.531	1.461	0.454	0.433
LSD at 5%			0.65	0.88	0.22	0.88	0.08	0.88	0.20	0.08	0.017	0.058	0.011	0.038	0.028	0.095	0.08	0.28

AMF: Arbuscular mycorrhizal Fungi  
EM: Effective microorganisms

Pig: Pigeon manure

Comp.: Compost tea

HA: Humic acid

**Table 8: Effect of interaction between soil and foliar application with some natural materials on chemical constituents of snap bean pods during 2012 and 2013 seasons**

Treatments		Characters		Dry matter%		N%		P%		K%		Crude protein %		Total carbohydrates %	
Soil application	Foliar application	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season
Without	Without	10.93	11.08	3.11	3.05	0.249	0.239	2.18	2.10	19.42	19.04	26.17	25.47		
	Pig. (10g/l)	11.48	11.97	3.32	3.25	0.273	0.260	2.37	2.24	20.75	20.29	27.73	26.80		
	Comp.(10g/l)	11.00	11.23	3.18	3.08	0.256	0.249	2.24	2.14	19.89	19.27	26.53	25.77		
	HA. (3 cm/l)	11.44	11.84	3.25	3.18	0.264	0.255	2.37	2.20	20.31	19.85	27.27	26.50		
	EM (3cm/l)	11.31	11.60	3.22	3.16	0.258	0.253	2.27	2.14	20.13	19.75	27.30	26.13		
AMF	Without	11.77	12.31	3.53	3.37	0.287	0.266	2.52	2.37	22.06	21.06	28.57	28.07		
	Pig. (10g/l)	15.07	15.68	4.32	4.06	0.364	0.353	3.26	3.13	27.00	25.40	33.13	32.27		
	Comp.(10g/l)	12.34	12.94	3.64	3.49	0.296	0.290	2.69	2.49	22.77	21.81	30.33	29.23		
	HA. (3 cm/l)	14.13	14.61	4.05	3.91	0.338	0.328	3.04	2.94	25.31	24.44	32.43	30.93		
	EM (3cm/l)	13.20	13.94	3.86	3.68	0.318	0.308	2.88	2.71	24.13	23.02	31.20	30.07		
Yeast	Without	11.61	14.77	3.39	3.29	0.276	0.264	2.46	2.30	21.21	20.54	28.27	27.40		
	Pig. (10g/l)	14.76	15.56	4.25	4.04	0.359	0.342	3.17	3.08	26.54	25.27	34.17	31.73		
	Comp.(10g/l)	12.10	12.71	3.60	3.45	0.291	0.281	2.62	2.51	22.52	21.54	29.90	28.30		
	HA. (3 cm/l)	13.81	14.27	3.98	3.84	0.335	0.322	3.02	2.86	24.85	24.02	31.60	30.70		
	EM (3cm/l)	12.95	13.58	3.80	3.66	0.317	0.305	2.77	2.63	23.73	22.88	30.87	29.70		
AMF + Yeast	Without	11.83	12.45	3.59	3.34	0.289	0.277	2.54	2.37	22.42	20.88	29.30	28.00		
	Pig. (10g/l)	15.44	16.24	4.44	4.13	0.377	0.352	3.31	3.22	27.75	25.83	33.33	32.37		
	Comp.(10g/l)	12.52	13.21	3.72	3.57	0.303	0.297	2.77	2.59	23.27	22.33	30.10	29.03		
	HA. (3 cm/l)	14.30	15.19	4.16	4.06	0.349	0.342	3.12	3.04	26.00	25.38	33.07	31.47		
	EM (3cm/l)	13.40	13.97	3.87	3.78	0.327	0.321	2.94	2.77	24.17	23.60	31.53	30.30		
LSD at 5%		0.24	0.48	0.06	0.07	0.007	0.007	0.05	0.07	0.39	0.50	1.04	0.82		

AMF: Arbuscular mycorrhizal Fungi

Pig: Pigeon manure tea

Comp.: Compost tea

HA: Humic acid

EM: Effective microorganisms



**Table 9: Effect of soil and foliar application with some natural materials on weight loss and dry matter percentage during cold storage periods of snap bean pods during 2012 and 2013 seasons**

Characters	Weight loss %								Dry matter %							
	1 <sup>st</sup> season				2 <sup>nd</sup> season				1 <sup>st</sup> season				2 <sup>nd</sup> season			
	Days of cold storage															
Treatments	7 days	14 days	21 days	28 days	7 days	14 days	21 days	28 days	7 days	14 days	21 days	28 days	7 days	14 days	21 days	28 days
Soil application																
Without	10.76	16.73	22.90	24.13	8.69	16.28	22.24	23.19	11.79	12.36	12.92	13.48	12.12	12.70	13.28	13.85
AMF	10.56	16.42	22.46	23.76	8.52	15.96	21.81	22.74	13.96	14.63	15.29	15.96	14.59	15.29	15.98	16.68
Yeast	10.38	16.09	22.02	23.20	8.41	15.76	21.53	22.45	13.70	14.35	15.00	15.65	14.89	15.60	16.30	17.01
AMF+Yeast	8.76	13.59	18.62	19.62	7.23	13.58	18.51	19.30	14.17	14.85	15.52	16.20	14.92	15.64	16.35	17.06
LSD at 5%	0.14	0.21	0.29	0.31	0.05	0.10	0.14	0.15	0.16	0.17	0.18	0.18	0.51	0.50	0.52	0.55
Foliar application																
Without	11.10	17.26	23.63	24.90	8.91	16.69	22.80	23.77	12.11	12.69	13.26	13.84	13.28	13.92	14.55	15.18
Pig. (10g/l)	9.28	14.40	19.71	20.77	7.50	14.09	19.20	20.02	14.90	15.60	16.31	17.02	15.61	16.35	17.09	17.84
Comp. (10g/l)	10.48	16.32	22.34	23.54	8.62	16.15	22.07	23.01	12.59	13.19	13.79	14.39	13.15	13.77	14.40	15.03
HA. (3 cm/l)	10.09	15.59	21.34	22.48	8.21	15.39	21.02	21.92	14.09	14.76	15.43	16.10	14.68	15.38	16.08	16.78
EM (3cm/l)	9.62	14.95	20.49	21.58	7.82	14.65	20.02	20.86	13.35	13.99	14.62	15.26	13.94	14.60	15.26	15.93
LSD at 5%	0.10	0.12	0.17	0.18	0.08	0.15	0.21	0.22	0.13	0.13	0.14	0.14	0.47	0.53	0.55	0.58

AMF: Arbuscular mycorrhizal Fungi      Pig: Pigeon manure tea      Comp.: Compost tea      HA: Humic acid  
EM: Effective microorganisms

**Table 5: Effect of soil and foliar application with some natural materials on yield and its components of snap bean plants during 2012 and 2013 seasons**

Characters	Pod length (cm)		No. of pods /plant		Average pod weight (g)		Yield /plot (kg)		Total yield /fed. (ton)		Yield increase over control (%)	
	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season
Soil application												
Without	10.86	10.68	16.24	15.77	3.14	3.33	7.651	7.895	3.059	3.159	00.00	00.00
AMF	12.86	12.85	17.17	16.67	3.72	4.01	9.553	9.998	3.821	3.999	24.91	26.59
Yeast	12.61	13.11	17.39	16.32	3.65	4.09	9.508	9.950	3.806	3.979	24.42	25.95
AMF+Yeast	13.05	13.15	17.43	17.28	3.77	4.10	9.843	10.609	3.939	4.243	28.77	34.31
LSD at 5%	0.15	0.45	00.79	1.54	0.05	0.18	0.365	0.946	0.147	0.376	-	-
Foliar application												
Without	11.15	11.70	16.68	15.73	3.22	3.65	8.073	8.538	3.230	3.416	00.00	00.00
Pig. (10g/l)	13.71	13.75	16.86	16.15	3.97	4.29	10.037	10.381	4.014	4.152	24.27	21.55
Comp. (10g/l)	11.59	11.58	17.34	17.11	3.35	3.62	8.734	9.311	3.495	3.723	8.20	8.99
HA. (3 cm/l)	12.97	12.93	17.96	17.56	3.56	3.85	9.653	10.172	3.852	4.068	19.26	19.09
EM (3cm/l)	12.29	12.28	16.44	16.01	3.74	4.02	9.226	9.963	3.691	3.865	14.27	13.14
LSD at 5%	0.12	0.42	0.79	1.10	0.05	0.18	0.461	0.606	0.186	0.234	-	-

AMF: Arbuscular mycorrhizal Fungi

Pig: Pigeon manure tea

Comp.: Compost tea

HA: Humic acid

EM: Effective microorganisms

**Table 6: Effect of interaction between soil and foliar application with some natural materials on yield and its components of snap bean plants during 2012 and 2013 seasons**

Characters				Pods length (cm)		No. of pods /plant		Average pod weight (g)		Yield /plot (kg)		Total yield /fed. (ton)		Yield increase over control (%)	
Treatments				1 <sup>st</sup> season		2 <sup>nd</sup> season		1 <sup>st</sup> season		2 <sup>nd</sup> season		1 <sup>st</sup> season		2 <sup>nd</sup> season	
Soil application	Foliar application			1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season
Without	Without			10.57	10.24	15.81	15.13	3.05	3.19	7.242	7.257	2.897	2.907	00.00	00.00
	Pig. (10g/l)			11.10	11.07	16.60	16.36	3.21	3.46	7.994	8.481	3.197	3.390	10.3555	16.52
	Comp.(10g/l)			10.63	10.39	15.92	15.34	3.07	3.24	7.333	7.465	2.933	2.987	1.25	2.75
	HA. (3 cm/l)			11.06	10.95	16.54	16.18	3.19	3.42	7.932	8.298	3.170	3.320	9.425	14.21
AMF	EM (3cm/l)			10.93	10.73	16.36	15.85	3.16	3.35	7.755	7.973	3.100	3.190	7.01	9.74
	Without			11.37	11.39	17.02	16.82	3.29	3.56	8.398	8.974	3.360	3.590	15.98	23.50
	Pig. (10g/l)			14.56	14.50	16.73	15.56	4.21	4.53	10.568	10.543	4.227	4.217	45.90	45.06
	Comp.(10g/l)			11.93	11.96	17.84	17.67	3.45	3.73	9.224	9.900	3.690	3.957	27.37	36.12
	HA. (3 cm/l)			13.66	13.51	18.03	17.27	3.69	4.03	9.970	10.434	3.987	4.173	37.62	43.55
Yeast	EM (3cm/l)			12.76	12.90	16.23	16.05	3.95	4.21	9.608	10.142	3.843	4.057	32.65	39.56
	Without			11.22	13.66	16.80	13.94	3.24	4.26	8.168	8.750	3.267	3.500	12.77	20.40
	Pig. (10g/l)			14.26	14.39	17.28	16.22	4.12	4.49	10.695	10.934	4.277	4.373	47.64	50.43
Comp.(10g/l)			11.70	11.75	17.50	17.36	3.38	3.67	8.875	9.559	3.553	3.823	22.64	31.51	
50.09	40.49	4.363	4.070	10.905	10.142	3.92	3.62	18.55	18.67	13.20	13.35	HA. (3 cm/l)		AMF + Yeast	
32.09	33.34	3.840	3.863	9.601	9.659	4.12	3.86	15.52	16.68	12.56	12.52	EM (3cm/l)			
26.14	17.26	3.667	3.397	9.170	8.485	3.59	3.31	17.01	17.09	11.52	11.44	Without			
59.17	50.40	4.627	4.357	11.567	10.891	4.69	4.32	16.46	16.82	15.02	14.93	Pig. (10g/l)			
41.97	31.27	4.127	3.803	10.320	9.504	3.81	3.50	18.04	18.10	12.21	12.10	Comp.(10g/l)			
52.05	44.29	4.420	4.180	11.051	10.450	4.04	3.75	18.25	18.59	14.05	13.82	HA. (3 cm/l)			
50.43	36.59	4.373	3.957	10.935	9.884	4.39	3.99	16.62	16.50	12.92	12.96	EM (3cm/l)			
-	-	0.382	0.292	0.952	0.724	0.28	0.08	1.73	1.24	0.84	0.24	L.S.D at 5%			

AMF: Arbuscular mycorrhizal Fungi      Pig: Pigeon manure tea      Comp.: Compost tea      HA: Humic acid  
 EM: Effective microorganisms

**Table 7: Effect of soil and foliar application with some natural materials on chemical constituents of snap bean pods during 2012 and 2013 seasons**

Total carbohydrates %		Crude protein %		K%		P%		N%		Dry matter%		Characters
2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	
Soil application												
26.13	27.00	19.64	20.10	2.16	2.29	0.251	0.260	3.14	3.22	11.54	11.23	Without
30.11	31.13	23.15	24.25	2.73	2.88	0.309	0.320	3.70	3.88	13.90	13.30	AMF
29.57	30.96	22.85	23.77	2.67	2.81	0.303	0.315	3.66	3.80	14.18	13.04	Yeast
30.23	31.47	23.60	24.72	2.80	2.94	0.318	0.329	3.78	3.96	14.21	13.50	AMF+Yeast
0.79	0.52	0.15	0.32	0.02	0.02	0.003	0.004	0.02	0.05	0.48	0.15	LSD at 5%
Foliar application												
27.23	28.08	20.38	21.28	2.28	2.43	0.262	0.275	3.26	3.40	12.65	11.53	Without
30.79	32.09	24.20	25.51	2.92	3.03	0.327	0.343	3.87	4.08	14.86	14.19	Pig. (10g/l)
28.08	29.22	21.24	22.11	2.43	2.58	0.279	0.286	3.40	3.54	12.52	11.99	Comp. (10g/l)
29.90	31.09	23.42	24.12	2.76	2.89	0.312	0.322	3.75	3.86	13.98	13.42	HA. (3 cm/l)
29.05	30.23	22.31	23.04	2.56	2.72	0.297	0.305	3.57	3.69	13.27	12.71	EM (3cm/l)
0.56	0.71	0.18	0.18	0.03	0.03	0.003	0.003	0.04	0.03	0.46	0.12	LSD at 5%

AMF: Arbuscular mycorrhizal Fungi  
EM: Effective microorganisms

Pig: Pigeon manure tea

Comp.: Compost tea

HA: Humic acid

**Table 10: Effect of interaction between soil and foliar application with some natural materials on weight loss and dry matt percentage during cold storage periods of snap bean pods during 2012 and 2013 seasons**

Characters		Weight loss %								Dry matter %							
Treatments		1 <sup>st</sup> season				2 <sup>nd</sup> season				1 <sup>st</sup> season				2 <sup>nd</sup> season			
		Days of cold storage															
Soil application	Foliar application	7day	14	21	28	7	14da	21	28	7	14	21	28	7	14	21	28
		days	days	days	days	days	ys	days	days	days	days	days	days	days	days	days	days
	Without	12.07	18.78	25.71	27.08	9.51	17.81	24.35	25.38	11.48	12.03	12.57	13.12	11.63	12.18	12.74	13.29
	Pig. (10g/l)	9.76	15.17	20.77	21.88	7.68	14.40	19.67	20.51	12.05	12.63	13.20	13.77	12.57	13.17	13.77	14.36
Without	Comp.(10g/l)	11.31	17.60	24.09	25.38	9.34	17.50	23.91	24.93	11.55	12.10	12.65	13.20	11.79	12.36	12.92	13.48
	HA. (3cm/l)	10.52	16.36	22.39	23.59	8.69	16.28	22.24	23.19	12.01	12.58	13.16	13.73	12.43	13.03	13.62	14.21
	EM (3cm/l)	10.13	15.75	21.56	22.71	8.22	15.40	21.05	21.94	11.88	12.44	13.01	13.57	12.18	12.76	13.34	13.92
	Without	11.75	18.27	25.01	26.35	9.35	17.51	23.93	24.95	12.35	12.94	13.53	14.12	12.93	13.54	14.16	14.77
	Pig. (10g/l)	9.60	14.93	20.44	21.53	7.75	14.52	19.85	20.69	15.82	16.57	17.33	18.08	16.46	17.24	18.03	18.81
AMF	Comp.(10g/l)	11.02	17.13	23.45	24.71	8.99	16.85	23.03	24.01	12.95	13.57	14.19	14.80	13.58	14.23	14.88	15.52
	HA. (3 cm/l)	10.50	16.33	22.35	23.55	8.47	15.88	21.69	22.62	14.84	15.54	16.25	16.96	15.34	16.07	16.80	17.53
	EM (3cm/l)	9.91	15.41	21.09	22.22	8.02	15.04	20.56	21.43	13.85	14.51	15.17	15.83	14.64	15.34	16.04	16.73
	Without	11.55	17.96	24.59	25.91	9.30	17.43	23.82	24.83	12.19	12.77	13.35	13.93	15.51	16.24	16.98	17.72
	Pig. (10g/l)	9.23	14.36	19.65	20.70	7.56	14.17	19.36	20.18	15.49	16.23	16.97	17.71	16.34	17.12	17.90	18.68
Yeast	Comp.(10g/l)	10.82	16.82	23.02	24.26	8.84	16.56	22.64	23.60	12.71	13.31	13.92	14.52	13.34	13.98	14.62	15.25
	HA. (3 cm/l)	10.49	16.06	21.98	23.16	8.42	15.77	21.56	22.47	14.50	15.19	15.88	16.57	14.98	15.70	16.41	17.13
	EM (3cm/l)	9.80	15.24	20.86	21.98	7.93	14.86	20.30	21.16	13.60	14.24	14.89	15.54	14.25	14.93	15.61	16.29
	Without	9.03	14.04	19.22	20.25	7.47	13.99	19.12	19.93	12.42	13.01	13.60	14.20	13.08	13.70	14.32	14.94
AMF	Pig. (10g/l)	8.51	13.14	17.99	18.95	7.02	13.13	17.94	18.71	16.22	16.99	17.76	18.53	17.06	17.87	18.68	19.49
+	Comp.(10g/l)	8.76	13.75	18.82	19.83	7.31	13.69	18.70	19.51	13.14	13.77	14.40	15.02	13.87	14.53	15.19	15.85
Yeast	HA. (3 cm/l)	8.84	13.62	18.64	19.64	7.27	13.62	18.61	19.40	15.02	15.73	16.45	17.16	15.95	16.71	17.47	18.23
	EM (3cm/l)	8.66	13.41	18.42	19.41	7.09	13.29	18.16	18.93	14.07	14.74	15.41	16.08	14.67	15.37	16.07	16.77
	LSD at 5%	0.16	0.25	0.34	0.36	0.17	0.31	0.43	0.45	0.25	0.27	0.28	0.29	0.96	1.01	1.05	1.09
<b>AMF: Arbuscular mycorrhizal Fungi</b>		<b>Pig: Pigeon manure tea</b>				<b>Comp.: Compost tea</b>				<b>HA: Humic acid</b>							
<b>EM: Effective microorganisms</b>																	

**Table 11: Effect of soil and foliar application with some natural materials on total carbohydrates and crude protein percentage during cold storage periods of snap bean pods during 2012 and 2013 seasons**

Crude protein (%)								Total carbohydrates (%)								Characters Treatments
2 <sup>nd</sup> season				1 <sup>st</sup> season				2 <sup>nd</sup> season				1 <sup>st</sup> season				
Days of cold storage																
28 days	21 days	14 days	7 days	28 days	21 days	14 days	7 days	28 days	21 days	14 days	7 days	28 days	21 days	14 days	7 days	
Soil application																
15.31	16.84	18.04	18.91	15.96	17.55	18.86	19.57	22.2835	24.7986	26.55	27.11	22.73	25.57	27.15	28.21	Without
18.41	19.65	21.18	22.28	19.40	20.55	22.13	23.16	25.28	29.09	30.45	30.76	26.03	28.98	31.07	31.51	AMF
18.07	19.51	20.85	22.16	18.91	20.33	21.65	22.75	25.07	28.40	30.07	30.36	25.56	28.62	30.65	31.07	Yeast
18.92	20.13	21.72	22.89	19.74	20.99	22.24	23.53	25.63	29.13	30.83	31.2108	26.39	29.66	31.54	32.16	AMF+Yeast
0.69	0.28	0.36	0.42	0.27	0.40	0.42	0.70	0.22	0.36	0.55	0.55	0.35	0.49	0.75	0.49	LSD at 5%
Foliar application																
16.13	17.39	18.83	19.90	16.83	18.21	19.34	20.36	23.11	25.83	27.50	27.85	23.48	26.37	28.03	28.88	Without
19.27	20.95	22.32	23.53	20.31	21.83	23.48	24.76	26.34	29.42	31.70	31.99	26.60	29.89	32.00	33.07	Pig. (10g/l)
17.03	18.06	19.50	20.64	17.73	18.82	19.98	21.07	23.6473	26.937.01	28.32	28.96	24.35	27.29	29.04	29.49	Comp. (10g/l)
18.33	19.84	21.34	22.33	19.17	20.70	22.25	22.13	25.31	28.94	30.46	30.7963	26.17	29.26	31.33	31.79	HA. (3 cm/l)
17.64	18.93	20.24	21.40	18.48	19.73	21.05	21.82	24.43	28.16	29.41	29.71	25.30	28.22	30.13	30.47	EM (3cm/l)
0.29	0.35	0.39	0.35	0.36	0.42	0.38	1.14	0.50	0.44	0.36	0.44	0.43	0.61	0.33	0.38	LSD at 5%

AMF: Arbuscular mycorrhizal Fungi

Pig: Pigeon manure tea

Comp.: Compost tea

HA: Humic acid

EM: Effective microorganisms

**Table 3: Effect of soil and foliar application with some natural materials on vegetative growth characters and photosynthetic pigments of snap bean plants during 2012 and 2013 seasons**

Photosynthetic pigments(mg/g) fresh weight								Total dry weight (g/plant)		No. of branches /plant		No. of leaves /plant		Plant height (cm)		Characters treatments
Carotenoides		Total chlorophyll		Chlorophyll b		Chlorophyll a		2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	
2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	2 <sup>nd</sup> season	1 <sup>st</sup> season	season	season	season	season	season	season	season	season	
Soil application																
0.358	0.380	1.207	1.283	0.476	0.505	0.732	0.778	6.28	6.04	3.50	3.60	11.17	10.05	31.44	30.15	Without
0.431	0.450	1.453	1.519	0.572	0.598	0.881	0.921	7.52	7.13	4.21	4.26	13.44	11.90	37.84	35.70	AMF
0.439	0.441	1.483	1.490	0.584	0.587	0.899	0.903	7.67	7.01	4.29	4.18	13.71	11.67	38.60	35.02	Yeast
0.440	0.457	1.486	1.542	0.586	0.607	0.901	0.935	8.00	7.28	4.30	4.33	13.75	12.08	38.71	36.24	MF+Yeast
0.15	0.05	0.047	0.017	0.019	0.007	0.031	0.011	0.04	0.10	0.15	0.05	0.47	0.14	1.31	0.41	LSD at 5%
Foliar application																
0.392	0.390	1.323	1.318	0.521	0.519	0.802	0.799	6.69	6.09	3.83	3.70	12.24	10.32	34.45	30.97	Without
0.461	0.480	1.554	1.621	0.612	0.638	0.942	0.982	8.27	7.78	4.50	4.55	14.38	12.69	40.47	38.08	Pig. (10g/l)
0.388	0.406	1.309	1.370	0.516	0.540	0.794	0.830	6.87	6.35	3.79	3.84	12.11	10.73	34.09	32.19	Comp. (10g/l)
0.433	0.454	1.462	1.533	0.576	0.604	0.886	0.929	7.75	7.30	4.23	4.30	13.52	12.01	38.07	36.03	HA. (3 cm/l)
0.411	0.430	1.388	1.452	0.547	0.572	0.841	0.880	7.25	6.80	4.02	4.08	12.84	11.38	36.14	34.13	EM (3cm/l)
0.14	0.04	0.050	0.014	0.020	0.005	0.029	0.008	0.05	0.12	0.14	0.04	0.44	0.11	1.24	0.33	LSD at 5%

AMF: Arbuscular mycorrhizal Fungi

Pig: Pigeon manure tea

Comp.: Compost tea

HA: Humic acid

EM: Effective microorganisms

**Table 12: Effect of interaction between soil and foliar application with some natural materials on total carbohydrates and crude protein percentage during cold storage periods of snap bean pods during 2012 and 2013 seasons**

Crude protein (%)								Total carbohydrates (%)								Characters	
2 <sup>nd</sup> season				1 <sup>st</sup> season				2 <sup>nd</sup> season				1 <sup>st</sup> season					
Days of cold storage																	
28 days	21 days	14 days	7 days	28 days	21 days	14 days	7days	28 days	21 days	14days	7 days	28 days	21 days	14 days	7days	Treatments	
																Foliar application	Soil application
14.97	16.33	17.87	18.73	15.13	17.07	18.30	19.30	22.10	24.33	26.03	26.73	22.17	25.00	26.83	27.73	Without	Without
16.00	17.47	18.57	19.33	16.63	18.17	19.13	20.30	22.57	25.43	27.00	27.60	23.27	26.10	27.23	28.73	Pig. (10g/l)	
15.20	16.83	17.47	18.57	15.73	17.00	18.50	19.23	21.63	24.37	26.23	26.93	22.30	25.33	26.80	27.93	Comp.(10g/l)	
15.57	17.30	18.33	19.30	16.53	17.83	19.43	19.80	22.57	25.17	27.00	27.17	23.13	25.77	27.70	28.50	HA. (3 cm/l)	
14.83	16.27	17.97	18.60	15.77	17.70	18.93	19.20	22.53	24.67	26.50	27.10	22.80	25.63	27.20	28.13	EM (3cm/l)	
16.50	17.73	19.17	20.20	17.57	18.33	19.77	20.83	23.37	26.67	28.03	28.30	23.83	26.90	28.37	29.10	Without	AMF
20.40	21.90	23.20	24.77	21.57	23.13	25.27	26.40	27.57	30.83	33.47	33.20	27.67	31.13	33.40	34.47	Pig. (10g/l)	
17.60	18.47	20.00	21.03	18.20	19.30	20.43	21.67	24.17	28.23	28.83	29.90	25.13	27.87	29.83	30.07	Comp.(10g/l)	
19.13	20.43	22.20	23.50	20.17	21.67	23.17	24.13	26.07	30.00	31.60	31.83	27.27	29.93	32.53	32.73	HA. (3 cm/l)	
18.40	19.70	21.33	21.90	19.50	20.30	22.00	22.77	25.23	29.73	30.37	30.57	26.27	29.07	31.23	31.26	EM (3cm/l)	
16.07	17.57	18.63	19.90	16.80	18.43	19.57	20.50	23.30	25.83	27.83	27.73	23.43	26.27	27.93	28.93	Without	Yeast
19.83	21.80	23.17	24.67	20.80	22.30	24.17	25.50	27.13	30.40	32.43	33.20	27.47	30.70	33.20	33.80	Pig. (10g/l)	
17.13	18.27	19.80	21.00	18.30	19.27	20.57	21.48	23.97	26.57	28.67	29.17	24.53	27.68	29.30	29.53	Comp.(10g/l)	
19.07	20.23	22.13	22.77	19.77	21.57	22.77	23.50	26.20	30.17	31.43	31.47	26.90	29.63	32.17	32.30	HA. (3 cm/l)	
18.27	19.70	20.50	22.47	18.90	20.07	21.20	22.30	24.77	29.03	29.97	30.23	25.47	28.80	30.67	30.80	EM (3cm/l)	
16.97	17.93	19.67	20.77	17.83	19.00	19.73	20.80	23.67	26.50	28.13	28.63	24.50	27.30	28.97	29.73	Without	AMF + Yeast
20.83	22.63	24.33	25.33	22.23	23.70	25.37	26.83	28.10	31.00	33.90	33.97	28.00	31.63	34.17	35.27	Pig. (10g/l)	
18.20	18.67	20.73	21.97	18.70	19.70	20.40	21.90	24.80	28.53	29.53	29.83	25.43	28.30	30.23	30.43	Comp.(10g/l)	
19.53	21.40	22.70	23.73	20.20	21.73	23.63	25.10	26.40	30.43	31.80	32.70	27.37	31.70	32.93	33.63	HA. (3 cm/l)	
19.07	20.03	21.17	22.63	19.73	20.83	22.07	23.00	25.17	29.20	30.80	30.93	26.67	29.37	31.40	31.73	EM (3cm/l)	
0.59	0.70	0.78	0.71	0.73	0.85	0.76	N.S	1.01	0.88	0.71	0.87	0.85	1.22	0.66	0.76	LSD at 5%	

AMF: Arbuscular mycorrhizal Fungi

Pig: Pigeon manure tea

Comp.: Compost tea

HA: Humic acid

EM: Effective microorganisms

**Table 13. Some correlation coefficient between yield and its components of snap bean plants during 2012 and 2013 seasons**

Season 2013			Season 2012			Characters	
3	2	1	3	2	1		
1.000 <sup>**</sup>	0.835 <sup>**</sup>	0.537 <sup>**</sup>	1.000 <sup>**</sup>	0.928 <sup>**</sup>	0.549 <sup>**</sup>	Total yield (ton/fed.)	Y
0.536 <sup>*</sup>	-0.013 <sup>NS</sup>		0.546 <sup>**</sup>	0.198 <sup>NS</sup>		No. of pods/plant	1
0.836 <sup>**</sup>			0.929 <sup>**</sup>			Average pod weight (g)	2
						Green pods yield (kg/plot)	3

NS= Not significant

. = Significant

..= Highly significant



**Table 6: Genotypes means (G) at two locations (L) and two sowing date (D) for plant spike length and number of kernels over two years.**

Mean	Number of kernels/spike					Spike length (cm)					Genotype No.
	L2		L1		Mean	L2		L1			
	D2	D1	D2	D1		D2	D1	D2	D1		
54.80	49.43	59.03	50.43	60.29	12.41	11.36	13.02	11.76	13.48	1	
54.55	49.21	58.77	50.21	60.02	10.74	9.77	11.34	10.11	11.75	2	
45.57	41.10	49.09	41.94	50.14	12.96	11.89	13.58	12.31	14.06	3	
49.40	44.56	53.21	45.46	54.35	13.00	11.93	13.61	12.35	14.10	4	
55.81	49.53	60.92	50.53	62.24	10.75	9.77	11.35	10.12	11.75	5	
47.78	41.88	52.69	42.72	53.83	11.39	10.39	11.99	10.76	12.42	6	
47.53	42.88	51.19	43.76	52.30	10.67	9.69	11.27	10.04	11.67	7	
37.57	31.49	42.83	32.13	43.81	10.76	9.78	11.36	10.13	11.76	8	
31.11	28.05	33.51	28.63	34.23	10.12	9.16	10.71	9.49	11.10	9	
49.57	44.72	53.39	45.62	54.53	12.47	11.43	13.08	11.83	13.55	10	
49.74	44.88	53.57	45.78	54.71	10.81	9.84	11.41	10.18	11.81	11	
45.54	40.80	49.34	41.63	50.40	12.42	11.37	13.03	11.77	13.49	12	
51.34	46.29	55.31	47.25	56.51	10.07	9.12	10.67	9.44	11.05	13	
44.14	39.82	47.55	40.63	48.57	11.85	10.83	12.46	11.21	12.90	14	
44.49	40.13	47.93	40.95	48.96	10.16	9.21	10.76	9.53	11.14	15	
39.67	35.78	42.73	36.51	43.65	10.15	9.20	10.75	9.52	11.13	16	
39.81	35.92	42.88	36.64	43.79	10.27	9.32	10.86	9.64	11.24	17	
66.96	60.41	72.12	61.63	73.66	15.30	14.13	15.93	14.63	16.49	18	
35.22	28.73	40.94	29.24	41.96	8.54	7.63	9.14	7.91	9.47	19	
46.97	40.99	51.97	41.82	53.11	10.86	9.81	11.53	10.16	11.94	20	
47.68	43.01	51.36	43.88	52.45	9.26	8.18	10.01	8.47	10.37	21	
50.80	45.84	54.72	46.76	55.88	11.93	10.91	12.54	11.29	12.98	22	
61.94	55.89	66.72	57.01	68.14	12.50	11.46	13.11	11.86	13.58	23	
47.72	43.07	51.40	43.92	52.48	10.28	9.33	10.88	9.66	11.26	24	
43.46	39.20	46.81	40.00	47.82	10.74	9.76	11.34	10.10	11.74	25	
33.79	30.45	36.40	31.09	37.21	9.96	9.00	10.56	9.32	10.94	26	
37.87	34.16	40.79	34.85	41.67	10.72	9.74	11.32	10.09	11.72	27	
46.37	41.84	49.95	42.68	51.01	11.94	10.92	12.54	11.30	12.99	28	
46.83	42.26	50.45	43.10	51.51	13.66	12.57	14.28	13.01	14.78	29	
54.68	49.32	58.90	50.33	60.17	12.95	11.88	13.56	12.29	14.05	30	
34.60	24.67	43.67	25.11	44.93	10.82	9.77	11.49	10.11	11.90	31	
46.26	41.74	49.83	42.58	50.89	13.04	11.97	13.66	12.39	14.14	32	
48.74	43.98	52.50	44.86	53.61	11.97	10.95	12.57	11.33	13.02	33	
65.56	59.15	70.62	60.34	72.12	10.79	9.82	11.39	10.16	11.79	34	
46.53	39.43	52.63	40.23	53.82	11.31	10.31	11.91	10.67	12.34	35	
42.25	38.12	45.50	38.90	46.48	10.72	9.74	11.32	10.08	11.72	36	
47.02	41.91	51.15	42.75	52.26	11.34	10.33	11.95	10.70	12.38	Mean	

  

Sohag location = L1	LSD <sup>0.01</sup>	LSD <sup>0.05</sup>	LSD <sup>0.01</sup>	LSD <sup>0.05</sup>	G
Aswan location = L2	4.73	3.59	1.15	2.46	LG
Favorable sowing date = D1	4.52	2.97	4.33	3.26	DG
Late sowing date = D2	0.73	0.55	0.03	0.07	