INTERNATIONAL JOURNAL OF PLANT, ANIMAL AND ENVIRONMENTAL SCIENCES
IJPAES
Volume-5, Issue-4, Oct-Dec-2015 Coden: IJPAJX-CAS-USA, Copyrights@2015 ISSN-2231-4490
Received: 10th Aug-2015 *Revised: 28th Aug-2015* *Accepted: 29th Aug-2015*
Research article

RESPONSE OF GRAIN YIELD AND ITS COMPONENTS TO ORGANIC MATTER AND REMOVAL OF SOME PHOTOSYNTHETIC ORGANS OF DURUM WHEAT (*Triticum aestivum* L.) IN TWO YEARS OF SULAIMANI- IRAQ REGION

Sherwan Ismail Towfiq[1], Shang Haseeb Abdulqader[2], Kazhal rashed ahmad[3] and Shara Jalal Hama[4]

University of Sulaimani - Faculty of Agricultural Sciences – Sulaimani – Iraqi Kurdistan Region
E-mail: Dr.Sherwan56@yahoo.com, Shangsham@hotmail.com, Kazhal2015@yahoo.com and Sharajalal@yahoo.com

ABSTRACT: This investigation was conducted during the growing season of two years 2012-2013 respectively, at one location (Qlyasan Agriculture Research Station, faculty of Agriculture science- University of Sulaimani), using split-t plots design in RCBD with three riplications. Durum wheat variety (Ovanto) was used grown. Organic matter which contant of (Ec 0.19 ds. m^{-1}, N 2%, P 2.5%, K 2.1%, O. M 60%, moisture 40% and P.H 7.5% (Agriculture research center compost) which uesd for four levels (4, 8 and 12) ton/ ha and control implemented in the main-plots as the first factor, while four photosynthetic organs removal treatments as the second factor were implemented in the sub plots that were (flag leaf blade removal, awns removal, and flag leaf blade + awns removal) and control. Grain yield with some of its components were measured such as number of spikes/ m^2, spike weight/ m^2, spike length, number of spikelets/ spike, number of grain/ spike, grain weight/ spike, 1000- grain weight, and grain yield). Data on biological yield and harvest index were also recorded. The results of grain yield and its components with biological yield, and harvest index can be summarized as the average of both years as follows: the effect of organic matters on the characteristics, number of spikes/ m^2, spike weight/ m^2, grain weight/ spike, grain yield, biological yield and harvest index significantly responded to these effects. While the characteristics number of spike length, number of spikelets/ spike, number of grains/spike and 1000-grains yield non significantly responded, 8 ton/ showed maximum values for the characteristics: number of spikes/ m^2, spike weight/ m^2, 4 ton/ha exhibited maximum grains weight/spike, grain yield and harvest index. While 12 ton/ha showed maximum values for the characteristic biological yield. However, 0 ton/ha produced minimum values for the characteristics; spike weight/ m^2, and biological yield. Regarding the effect of removal treatments on yield characteristics, and its components as the average of both years, all characteristics significantly responded to these effects. The removing both flag leaf blade + awn produced maximum values of number of spikes/ m^2 spike length, number of spikelets/spike, number of grains/spike, grains weight/spike, grain yield and harvest index. while control treatments showed maximum values in spike weight/ m^2, 1000- grains weight, and biological yield.
Key Words: Durum wheat, organic matter, photosynthetic organs removal treatments, yield and its components.

INTRODUCTION

Now a day's cereals are an essential dietary protein source throughout the world, because they constitute the main protein and energy supply in the majority of countries [1]. Organic matter is regarded as a very important parameter of soil fertility and productivity. Significantly affect soil, both in their physical structure, sink for plant nutrients and medium for biological activities. Organic matter has biggest contribution to soil productivity. It provides nutrients to the soil, improves water holding capability and helps the soil to maintain greatest aeration for seed germination and plant root improvement [2]. Compost prepared from crop residues, leaves, grass clippings, plant stalks, wines, weeds, twigs and branches are extremely good option which proved useful in the majority countries of the world. Use of compost has not only been adopted to increase soil organic matter and enrich it in various nutrients but also to control the environmental pollution from debris. In Pakistan, this field remained neglected and no systematic study was conducted to standardize the composting technology. Raw manure use has often been associates with imbalances in soil fertility [3]. Higher soil organic matter concentrations have been experienced to develop the yield and yield components of cereals. The grain yield and grain components (plant height, number of fertile tillers and 1000 grain weight) of rice and wheat improved significantly with the application of different organic materials but manure proved the most superior in this regard.

The combination of manure with chemical fertilizer further enhanced the biomass and grain yield of both crops. Many scientists in this filed suggested that the use of organic matter along with chemical fertilizers can give the greatest grains yield than obtained with synthetic chemical fertilizers alone [4, 5 and 6]. Wheat economically account as one of the most important crops of these regions. Two studies have been extensive performed to evaluate the effect of nitrogen fertilization on wheat yield at field scale. We pooled these published data to establish relationships between wheat yield and soil and climate variable under a wide range of soils and management conditions. Overall soil carbon was the variable more associated with yield (r2=0.25). Enhancing in the crop production expected between soil with low and high carbon levels rounded 2,200 ton/ha. A multivariate model which included carbon in the light fraction, potential mineralizable nitrogen, available mineral nitrogen, and rainfall was obtained, explaining 50% of wheat yield variability. These consequences highlight the importance of organic matter on grain production in the humid pampas. This consequence can be due to the role of organic soil components as source of nutrients for crops [7]. In durum wheat, if flag leaves (blade plus sheath) and ears were kept in the dark from one week after a thesis to maturity, grain weight was reduced by 22.4 % and 59.0 %, respectively [8]. Contribution to the yield of cereals has traditionally been studied using yield and different yield components, thus neglecting the function of other organs such as ear awns and flag leaf. In recent times, it is seriously important is to investigate the effects of genotypes on the photosynthetic activity of the flag leaf blade and the ear awns of spring wheat. The parameters connected with the photosynthetic activity were examined about the grain yield and dissimilar yield components at maturity [9]. During the grain filling period, awns, flag leaf, first upper leaf, second upper leaf and third upper leaf are the potentially efficient photosynthetic organs in terms of economic production in wheat [10] Contribution rate of flag leaf to daily photosynthetic products varies from 50 % to 60 %. However, contribution rate of ear to grain yield is associated with ear type (awned ear or awnless ear; compact ear or sparse ear). Contribution of glumes and awns to grain yield can be extremely high depend on environmental conditions [11 and 12]. In wheat, the leaves especially the flag leaves have been considered to be the key organs contributing to higher yields. More to the point, their results suggested that awns play a dominant role in contributing to large grains and high grain yield in awned wheat cultivars, particularly during the grain filling stage [13]. Awns increased photosynthetic rates of the ears [14] awns increased the ear surface from 36% to 59%, depending on their length. Awns positively affected grain yield, with a standard increase of 10 and 16%. The effects of awns on grain yield and kernel weight strongly depend on the genetic background, on awn length and environmental conditions during grain filling [15].

The purpose of this experiment was to determine the role of photosynthetic organs (flag leaf and awn) of durum wheat and different level organic matter on yield and its components during 2012 and 2013.

MATERIALS AND METHODS

This investigation was conducted during winter seasons of 2012-2013 at Qlyasan Agriculture Research Station, Faculty of Agricultural sciences- University of Sulaimani for two years, 2 km northwestern of Sulaimani city (35° 34´ 307″ N and 45° 21´ 992″ E with an altitude of 765 masl), using split -plot design with three replicates [16]. To study durum wheat varieties (Ovanto) Grains of cultivars has been obtained from Bakrajo Research Center in Sulaimani, conducted with Randomized Completely Block Design (RCBD), the First factor was organic matter which contant of (Ec 0.19 ds. m^{-1}, N 2%, P 2.5%, K 2.1%, O. M 60%, moisture 40% and P.H 7.5% (Agriculture research center compost) which uesed four levels (4, 8, and 12) ton/ ha and control implemented in the main-plots, and the second factor was photosynthetic organs (leaf and awn) treatments, implemented in the sub-plots, which were control; (Flag leaf removal, Awns removal, and flag leaf blade + Awns removal). Each sub-plot consisted of four rows, 3 m long, and 0.25 m apart within rows.

The dates of drilling were November 11th, and 13th, 2012 and 2013 for first and second year respectively. The representative soil samples were taken from both fields before tillage at (0-30) cm depth, these samples were air dried then sieved using 2mm sieves, then packed for analysis. Some physical and chemical properties were analyzed at the Department of soil and water sciences, Faculty of Agriculture science, University of Sulaimani. The data were statistically analyzed according to the methods of analyses of variance as a general test, and combined analysis of variance across years was conducted. All possible comparisons among the means were carried out using L. S. D. test (Least Significant Difference) at a significant level of 5 % whenever significant they show their significant differences [17].

Studied Characteristics:

Yield and its components:

1- No. of spikes/ m^2: The mean number of spikes/ m^2.
2- Spike weight/ m^2: The mean spike weight/ m^2.
3- Spike length (cm): The mean length of ten spikes (cm).
4- No. of spikelets/ Spike: The mean of number of spikelets for ten spikes.

5- No. of grains/ Spike: The mean number of grains for ten spikes.
6- Grains weight/ spike (g): The mean grains weight for ten spikes.
7- 1000- Grain weight (g): The mean of 1000- grain weight for three samples for each treatment.
8- Grain yield (ton/ ha): One (m2) was harvested for each treatment then converted to grain yield/ hectare.
9- Biological yield (ton/ ha): The means (total vegetative biomass+ total economical organ yield) by g/ m^2 then converted to ton/ ha.
10- Harvest index (H.I.): Measured by separating the grains from straw yield and weighed to calculate the H.I. according to the following equation [18]:

$$H.I\%. = \frac{\text{Grain yield}}{\text{biomass yield}}$$

RESULTS AND DISCUSSION

Table (1) shows the effect of organic matter on the yield and yield components in both years and their average. It was noticed that this effect was non significantly for all characters with the exception of number of spikes/ m^2 , spike weight/ m^2 and grain yield which were significantly in the first year. While in the second year this table indicated the presence non sgnificant effect for all characters with the exception of number of spikes/ m^2, spike weight/ m^2, number of grains/spike and harvest index significantly responded to organic matter. However, in the average of both years there were significantly for all characters with the exception of spike length,number of spikelets/spike, number of grains/spike and 1000 grains weight there were non significantly responded.

Table -1: The effect of organic matter on yield and its components

Organic matter	No. of spikes /m^2	Spike weight / m^2(g)	spike length (cm)	No. of spikelets /spike	No. of grains / spike	Grains weight /spike(g)	1000 - Grains weight(g)	Grain yield (ton/ha)	Biological yield (ton/ ha)	Harvest Index (H.I.)
First year-2012										
0 ton/ha	429.833	1198.000	5.963	15.873	44.880	2.070	38.607	8.799	19.010	0.458
4 tonlha	444.250	1297.917	6.286	18.253	52.037	2.199	44.608	9.598	20.467	0.466
8 tonlha	463.000	1310.667	6.019	17.414	45.701	2.032	43.132	9.375	20.639	0.452
12 tonlha	460.167	1175.250	5.769	16.212	47.703	1.948	43.051	8.819	20.626	0.426
L.S.D ($p \leq 0.05$)	19.449	102.185	n.s	n.s	n.s	n.s	n.s	0.550	n.s	n.s
Second year-2013										
0 ton/ha	430.667	1188.250	6.242	18.400	53.625	2.368	48.283	8.890	19.193	0.467
4 tonlha	456.000	1300.167	6.100	17.650	50.733	2.252	47.163	9.376	19.897	0.476
8 tonlha	475.833	1340.250	6.292	18.375	48.775	2.142	46.884	9.242	19.503	0.476
12 tonlha	472.500	1233.000	6.308	18.308	51.783	2.030	47.311	8.575	19.853	0.435
L.S.D ($p \leq 0.05$)	28.064	105.356	n.s	n.s	2.201	n.s	n.s	n.s	n.s	0.027
Average of years										
0 ton/ha	430.25	1193.125	6.103	17.137	49.253	2.219	43.445	8.845	19.102	0.463
4 tonlha	450.125	1299.042	6.193	17.952	51.385	2.226	45.886	9.487	20.182	0.471
8 tonlha	469.417	1325.459	6.156	17.895	47.238	2.087	45.008	9.309	20.071	0.464
12 tonlha	466.334	1204.125	6.039	17.260	49.721	1.989	45.181	8.697	20.240	0.431
L.S.D ($p \leq 0.05$)	15.203	65.350	n.s	n.s	n.s	0.195	n.s	0.448	0.989	0.021

The grain yield and grain components (plant height, number of fertile tillers and 1000 grain weight) of rice and wheat improved significantly with the application of different organic materials but manure proved the most superior in this regard. The combination of manure with chemical fertilizer further enhanced the biomass and grain yield of both crops. Many scientists in this filed suggested that the use of organic matter along with chemical fertilizers can give the greatest grains yield than obtained with synthetic chemical fertilizers alone [4, 5 and 6]. Organic management makes greater result of enzyme activity [19 and 20]. During the whole winter wheat growing season, from planting stage to reviving stage is the vegetative growth phase of winter wheat which had minimal dry matter accumulation and fertilizer rate [21]. From jointing to blossoming stage, with the dry matter accumulation improve the claimed for N fertilizer increased, and in jointing stage, the root activity and root weight density of winter wheat enhanced [22]. Results of nitrogen and organic matters interaction effects observed that 100% compost submission and increasing nitrogen level from 40 to 80 ton/ha had no significant effect on dry land wheat yield [23].

Table (2) illustrates the effect of removal treatments on the yield and yield components in both years and their average. It was noticed that this effect was significantly for all characters with the exception of number of spikes/ m^2, spike weight and biological yield which were non-significantly in the first year. While in the second year this table indicated the presence non sgnificant effect for all characters with the exception of number of spikes/m^2, 1000 grains weight, grain yield and harvest index wich were significantly. However, in the average of both years there were significant for all characters. During the grain filling period, awns, flag leaf, first upper leaf, second upper leaf and third upper leaf are the potentially efficient photosynthetic organs in terms of economic production in wheat [10]. Contribution rate of flag leaf to daily photosynthetic products varies from 50 % to 60 %. However, contribution rate of ear to grain yield is associated with ear type (owned ear or awnless ear; compact ear or sparse ear). Contribution of glumes and awns to grain yield can be extremely high depend on environmental conditions [11 and 12]. Flag leaf removal significantly decreased plant height, spike length, number of grains per spike, 1000-grain weight and grain yield [24]. In wheat, the most important photosnythetic organs are leaves; especially the flag leaves. Typically lower leaves are shaded by the top one and maximum solar absorption appears in flag leaves. Thus, flag leaf and photosnythetic area above flag leaf was indicated the importance of these structures to increase grain yields [25, 26, 27 and 28].

Table- 2: The effect of removal treatments on means of yield and its components:

Removal Treatments	No. of spikes /m^2	Spike weight / m^2(g)	spike length (cm)	No. of spikelets / spike	No. of grains / spike	Grains weight /spike(g)	1000 - Grains weight(g)	Grain yield (ton/ha)	Biological yield (ton/ha)	Harvest Index (H.I.)
First year										
Control	436.917	1335.33	6.360	18.182	50.407	2.277	45.246	9.837	21.201	0.464
Flag Leaf blade	429.583	1157.08	6.197	16.922	47.428	1.881	42.493	7.920	18.728	0.427
Awn	466.917	1167.33	5.132	14.643	42.144	1.800	37.250	8.439	19.730	0.426
Both	463.833	1322.08	6.349	18.005	50.342	2.290	44.391	10.396	21.082	0.489
L.S.D ($p \leq 0.05$)	n.s	n.s	0.921	2.092	5.046	0.259	4.816	1.296	n.s	0.043
Second year										
Control	451.667	1383.67	6.325	18.292	51.558	2.252	48.100	9.744	20.408	0.483
Flag Leaf blade	421.417	1150.08	6.008	17.900	49.600	1.995	46.392	7.776	18.113	0.439
Awn	476.833	1163.50	6.100	18.067	51.175	2.288	46.231	8.606	19.742	0.437
Both	485.083	1364.42	6.508	18.475	52.583	2.256	48.918	9.957	20.181	0.496
L.S.D ($p \leq 0.05$)	45.810	n.s	n.s	n.s	n.s	n.s	1.701	0.867	n.s	0.047
Average of both years										
Control	444.292	1359.50	6.343	18.237	50.983	2.265	41.471	9.791	20.805	0.474
Flag Leaf blade	425.500	1153.58	6.103	17.411	48.514	1.938	39.681	7.848	18.421	0.433
Awn	471.875	1165.42	5.616	16.355	46.660	2.044	39.850	8.523	19.736	0.432
Both	474.458	1343.25	6.429	18.240	51.463	2.273	37.837	10.177	20.632	0.493
L.S.D ($p \leq 0.05$)	30.392	168.099	0.493	1.077	2.750	0.219	2.487	0.731	1.358	0.031

Table (3) in this table it was observed that the combination effect of both organic matter and removal treatments was non significantly on all characteristics with the exception of spike length, number of spikelets/spike ,number of grains/spike and 1000- grain weight which were significant in the first year. While in the second year the effect of both organic matter and removal treatments was non significantly on all characteristics with the exception of number of grains/spike and 1000 grains which were significantly responded. However, in the average of both years there were significant for all characters. Awns increased the ear surface from 36% to 59%, depending on their length. Awns positively affected grain yield, with a standard increase of 10 and 16%. The effects of awns on grain yield and kernel weight strongly depend on the genetic background, on awn length and environmental conditions during grain filling [15].When top leaves are removed, the lower ones supply assimilates to the grain. Influence of flag leaf removal has been recorded primarily to reduce grain yield. Removal of flag leaf and its combination with awneds affected grain yield more negatively in dwarf genotypes than taller ones [29]. The involvement to yield of flag leaf singly is 19% [30]. There was 16.1% lessening in grain yield after flag leaf removal at the heading [24]. Up to 13.2- 22.9 % grain yield decline has been reported by [31] and 34.5% grain reduction was made known by [10].

Table-3: Shows the combination effect of organic matter and removal treatments on yield and its components:

Org. Matter	Removal Treatments	No. of spikes /m^2	Spike weight /m^2(g)	e spike length (cm)	No. of spikelets /spike	No. of grains / spike	Grains weight /spike(g)	1000 - Grain weight(g)	Grain yield (ton/ha)	Bio. yield (ton/ha)	Harvest Index (H.I)
First year											
0 ton/ha	Control	374.000	1209.000	7.167	20.183	53.937	2.542	48.027	9.601	21.100	0.451
	Flag leaf blade	389.333	1053.667	7.000	16.900	46.537	1.915	41.333	7.441	17.470	0.427
	Awn	485.667	1234.000	3.930	11.890	36.000	1.719	31.067	8.338	18.042	0.461
	Both	470.333	1295.333	5.757	14.517	43.047	2.106	34.000	9.816	19.429	0.506
4 ton/ha	Control	465.667	1389.667	5.273	15.327	45.557	2.156	39.073	10.026	21.577	0.466
	Flag leaf blade	367.667	1225.333	7.487	20.353	58.767	2.409	51.333	8.867	18.313	0.485
	Awn	491.333	1270.000	6.023	18.103	48.707	1.916	39.693	9.421	21.043	0.451
	Both	452.333	1306.667	6.360	19.227	55.117	2.317	48.333	10.077	20.933	0.463
8 ton/ha	Control	479.000	1476.333	6.633	18.873	50.947	2.260	44.863	10.489	21.894	0.480
	Flag leaf blade	475.000	1289.000	5.150	15.053	40.830	1.715	38.433	8.132	19.185	0.430
	Awn	435.333	1095.667	5.107	14.730	38.863	1.827	38.533	8.145	19.321	0.412
	Both	462.667	1381.667	7.187	21.000	52.163	2.327	50.697	10.734	22.155	0.485
12 ton/ha	Control	429.000	1266.333	6.367	18.343	51.187	2.151	49.093	9.230	20.235	0.458
	Flag leaf blade	486.333	1060.333	5.150	15.380	43.577	1.487	38.870	7.240	19.943	0.367
	Awn	455.333	1069.667	5.467	13.847	45.007	1.740	39.707	7.850	20.515	0.379
	Both	470.000	1304.667	6.093	17.277	51.040	2.412	44.533	10.957	21.809	0.501
L.S.D ($p \leq 0.05$)		n.s	n.s	1.843	4.183	10.091	n.s	9.631	n.s	n.s	n.s
Second year											
0 ton/ha	Control	390.667	1323.000	6.433	18.200	50.600	2.243	50.167	9.530	20.857	0.468
	Flag leaf blade	381.333	1028.000	5.900	18.100	53.333	2.163	46.533	7.734	18.363	0.430
	Awn	465.333	1090.000	6.100	18.967	56.900	2.703	47.767	8.555	18.133	0.470
	Both	485.333	1312.000	6.533	18.333	53.667	2.360	48.667	9.740	19.417	0.501
4 ton/ha	Control	485.333	1416.333	6.267	18.100	54.067	2.683	45.317	10.186	21.903	0.468
	Flag Leaf blade	371.000	1179.333	5.833	16.700	45.833	1.877	48.600	7.994	16.393	0.499
	Awn	506.667	1287.667	5.867	17.500	48.467	2.123	44.683	9.731	21.267	0.456
	Both	461.000	1317.333	6.433	18.300	54.567	2.323	50.050	9.593	20.023	0.482
8 ton/ha	Control	482.667	1473.333	6.200	18.367	50.133	2.223	46.617	10.085	19.030	0.531
	Flag leaf blade	460.000	1252.333	6.267	18.433	49.667	2.147	46.117	8.161	18.267	0.449
	Awn	465.333	1169.333	6.300	18.100	48.867	2.397	46.353	8.327	19.067	0.441
	Both	495.333	1466.000	6.400	18.600	46.433	1.800	48.450	10.397	21.647	0.481
12 ton/ha	Control	448.000	1322.000	6.400	18.500	51.433	1.857	50.300	9.174	19.843	0.464
	Flag Leaf blade	473.333	1140.667	6.033	18.367	49.567	1.793	44.317	7.217	19.430	0.376
	Awn	470.000	1107.000	6.133	17.700	50.467	1.930	46.120	7.812	20.500	0.380
	Both	498.667	1362.333	6.667	18.667	55.667	2.540	48.507	10.098	19.637	0.518
L.S.D ($p \leq 0.05$)		n.s	n.s	n.s	n.s	5.072	n.s	3.402	n.s	n.s	n.s
Average of both years											
0 ton/ha	Control	382.334	1266.000	6.800	19.192	52.269	2.393	49.097	9.566	20.979	0.460
	Flag leaf blade	385.33	1040.833	6.450	17.500	49.935	2.039	43.933	7.588	17.917	0.429
	Awn	475.500	1162.000	5.015	15.429	46.450	2.211	39.417	8.447	18.088	0.466
	Both	477.833	1303.666	6.145	16.425	48.357	2.233	41.334	9.778	19.423	0.504
4 ton/ha	Control	475.500	1403.000	5.770	16.736	49.812	2.420	42.195	10.106	21.740	0.467
	Flag leaf blade	369.334	1202.333	6.660	18.527	52.300	2.143	49.967	8.431	17.353	0.492
	Awn	499.000	1278.833	5.945	17.802	48.587	2.020	42.188	9.576	21.155	0.453
	Both	682.833	1312.000	6.396	18.764	54.842	2.320	49.192	9.833	20.478	0.472
8 ton/ha	Control	480.833	1474.833	6.416	18.620	50.540	2.242	45.740	10.287	20.462	0.505
	Flag leaf blade	467.500	1270.666	5.708	16.743	45.249	1.931	42.275	8.147	18.726	0.439
	Awn	450.333	1132.500	5.703	16.415	43.865	2.112	42.443	8.236	19.194	0.426
	Both	479.000	1423.833	6.793	19.800	49.298	2.064	49.574	10.566	21.901	0.483
12 ton/ha	Control	438.500	1294.166	6.383	18.422	51.310	2.004	49.697	9.202	20.039	0.461
	Flag leaf blade	479.833	1100.500	5.591	16.874	46.572	1.640	41.594	7.229	19.687	0.371
	Awn	462.667	1088.334	5.800	15.774	47.737	1.835	42.914	7.831	20.508	0.380
	Both	484.334	1333.500	6.380	17.972	53.354	2.476	46.520	10.528	20.723	0.509
L.S.D ($p \leq 0.05$)		60.785	336.198	0.986	2.155	5.492	0.440	4.974	1.462	2.717	0.062

Table (4) shows the effect of years on yield and its components. It was observed that the effect of years was non significantly on all characteristics with the exception of number of spikelets/ spike number of grains/spike and 1000- grain weight which were significantly responded. The second year predominated the first year in the characteristics of number of spikelets/ spike number of grains/spike and 1000 grains weight. Awneds, flag leaf, and 3rd nodal leaf are the potentially efficient photosynthetic organs in terms of economic output of the wheat plant, how much these structures donate to final grain weight are usually dependent on the environment and genetic potential of the variety [32 and 10]. Crop yields were powerfully dependent on solar radiation under normal rainfall conditions. As the effect of rainfall on soil water is relatively long-lasting, its valuable effect in vegetative stage was higher than its effect during the reproductive stage. The model provided good assessment of wheat yield when conditions resulted in medium yield levels, however, in extremely low or high yield years, conforming to extremely low or high precipitation in the vegetative stage, the model tended to underrate or overrate. Under high growing season precipitation, simulations responded more positively to reproductive stage rainfall than measured yields [33]. The predominating of grain yield in second year may be due the creating best environmental and soil conditions for planting growth, and increase in 1000- kernels weight in this year was due to the different between years. The differences of yield and its components due to many variables including genetic variation, cultural practices and environmental factors.

Table-4: The effect of years on means of yield and its components:

Years	No. of spikes /m^2	Spike weight /m^2(g)	spike length (cm)	No. of spikelets /spike	No. of grains/ spike	Grains weight /spike(g)	1000 - Grains weight(g)	Grain yield (ton/ ha)	Biological yield (Ton .ha^{-1})	Harvest Index(H.I.)
First year	449.313	1245.45	6.009	16.938	47.580	2.062	42.349	9.148	20.185	0.451
Second year	458.750	1265.41	6.235	18.183	51.229	2.198	47.410	9.021	19.611	0.464
LSD ($P \leq 0.05$)	n.s	n.s	n.s	1.090	3.436	n.s	2.552	n.s	n.s	n.s

REFERENCES

[1] Bos C; Juillet B; Fouillet H; Turlan L; Dare S; Luengo C; N'tounda R; Benamouzig R; Gausseres N, Tome D and Gaudichon C., 2005. Postprandial metabolic utilization of wheat protein in humans. Am J Clin Nutr 81: 87-94.

[2] Zia, M. S.; M.B. Baig and M.B. Tahir., 1998. Soil environmental issues and their impact on agricultural productivitiy of high potential areas of Pakistan. Science vision, 4(2):56-61.

[3] Kuepper, G. 2003. Manures for organic crop production. http: www.attra.mcat.org/attra-pub/PDF/manures.pdf. Fundamentals of Dustainable Agriculture. Appropriate technology transfer for rural areas (ATTRA). U.S.A.

[4] Sarwar, G., 2005. Use of compost for crop production in Pakistan. Okologie abd Umweltsicherung, 26/2005. Universitate Kassel, Fachgebiet Landschaftsokologie and naturschutz, Witzenhausen, Germany.

[5] Sarwar, G., N. Hussain, H. Scheimsky and S. Muhammad., 2007. Use of compost an environment friendly technology for enhancing rice-wheat production in Pakistan. Pakistan journal of Botany, 39(5): 1553-1558.

[6] Sarwar, G.; N. Hussain; H. Schmeisky; S. Muhammad; M. Ibrahim and E. Safdar., 2008. Improvement of soil physical and chemical properties with compost application in rice-wheat cropping system. Pakistan journal of Botany, 40(1): 275-282

[7] R. Alvarez, C.R. Alvarez and H. S. Steinbach., 2007. Association between soil organic matter and wheat yield in humid pampa of agriculture. Comunication in soil science and plant analysis.Vol.33, Issue 5-6 pp: 749-757.

[8] Araus, J. L. H. R. Brown, A. Febrero, J. Bort and M. D. Serret., 1993. Ear photosynthesis, carbon isotope discrimination and the contribution of respiratory CO2 to differences in grain mass in durum wheat. Plant, Cell & Environment 16 (4): 383-392.

[9] Khaliq, L.; A. Irshad and M. Ahsan., 2008. Awns and flag leaf contribution to grain yield in spring wheat (Triticum aestivum L.), Akadėmiai Kiadơ, cereal research communications- Journal Article, Vol. 36, No.1, pp: 65-76.

[10] Mahmood, N. and M.A. Chowdhry. 1997. Removal of green photosynthetic structures and their effect on some yield parameters in bread wheat. Wheat information service 85, pp: 14-20.

[11] Evans, L. T. and M. Rawson, 1970. Photosynthesis and respiration by the flag leaf and components of the ear during grain development in wheat. Aust. J. Biol. Sci. 23: 245-254.

[12] Birsin, M. A., 2005. Effects of removal of some photosynthetic structures on some yield components in wheat. Ankara University, Faculty of Agriculture. Journal of Agricultural Science 11(4): 364-367.

[13] Li, X., H. Wang, H. Li, L. Zhang, N. Teng, Q. Lin, J. Wang, T. Kuang, Z. Li, B. Li, A. Zhang and J. Lin., 2006. Awns play a dominant role in carbohydrate production during the grain-filling stages in wheat (Triticum aestivum L.). Physiologia plantarum 127 (4): 701-709.

[14] Olugbemi, L. B. and M. G. Bush., 1987. The influence of temperature on the contribution of awns to yield in wheat. Australian Journal of Plant Physiology 14 (3): 299-310.

[15] Motzo, R. and F. Giunta., 2002. Awnedness affects grain yield and kernel weight in nearisogenic lines of durum wheat. Australian Journal of Agricultural Research 53 (12): 1285-1293.

[16] Al- Mohamad, F. and M.A. AL- Yonis., 2000. Agricultural Experimentation Design and analysis, Baghdad University. Ministry of Higher Education and Scientific research part 1 and 2, pp: 374-444 (in arabic).

[17] Al-Rawi and Khalfalah., 1980. Design and Analysis of Agricultural Experiments, College of Agriculture -and Forestry, Mosul University. Pp: 361-363 (in arabic).

[18] Egliq, D.B., 1998. Seed biology and yield of grain crops. Biddles limited.U.K.

[19] Maeder p.; Fliessbach A.; Dubois D.; Gunst L.; Fried P.and Niggli U., 2002. Soil fertility and biodiversity in organic farming science 296: pp:1694-1697.

[20] B. Moesckops; Sukristiyonubowo; D.Buchan; and at al., 2010. Soil microbial communities and activities under intensive organic and conventional vegetable farming in West Jav, Indonesia. Appl soil Ecol; 45:112-120.

[21] Dordas C.,2009. Dry matter, nitrogen and phosphorus accumulation, partitioning and remobilization as affected by Nand Pfertilization and source-sink relations.Eur J Agron; 30: 129-139.

[22] Shi Z.; Jing Q.; Cai J.; Jiang D.; Cao W. and Dai T., 2012. The fates of 15 N fertilizer in relation to root distributions of winter wheat under different N splits. Eue J Agron;40: 86-93.

[23] Kazeimeini S. A.;H. Gadiri.; N.; Karimian..; A. A. Haghighi and M. Kheradnam., 2008. Interaction effects of nitrogen and organic matters on growth and yield of dryland wheat (Triticum aestivum L.). Journal of science and technology of agriculture and natural resources1/2008.pp:1-2.

[24] Mahmood A.; Alam K.; Salam A.; Iqbal S., 1991: Effect of flag leaf removal on grain yield its components and quality of hexaploid wheat. Cereal Research Communications.. pp: 305-310.

[25] Hsu, P. and P.D. Walton., 1971. Relationships between yield and its components and structures above the flag leaf node in spring wheat. Crop Science 11 (1): 190-193.

[26] Mohiuddin, S. H. and L. I. Croy., 1980. Flag leaf and peduncle area duration in relation to winter wheat grain yield. Agronomy Journal 72(2): 299-301.

[27] Sen, A. and M. Prasad., 1996. Critical period of flag-leaf duration in wheat (Triticum aestivum L.) Indian journal of Agricultural Sciences 66 (10): 599-600.

[28] Cruz-aguado, J. A, F. Reyes, R. Rodes, I. Perez and M. Dorado., 1999. Effect of source-to-sink ratio on partitioning of dry matter and 14C-photoassimilates in wheat during grain filling. Annals of Botany 83: 655-665.

[29] Chhabra, A.K. and S.K. Sethi, 1989. Contribution and association of awns and flag-leaf with yield and its components in durum wheat. Cereal Research Communications 17 (3-4): 265-271. [35] Imaizumi, N.; M. Samejima and K. Ishihara. 1997. Characteristics of photosynthetic carbon metabolism of spikelets in rice. Photosynth. Res., 52, pp: 75-82.

[30] Das, N.R. and N. N. Mukherjee, 1991. Grain yield contribution by leaf and awn in dwarf wheat (Triticum aestivum L.) after rice (Oryza sativa L.). Enviroment and Ecology 9(1):33-36.

[31] Singh, D. and D. Singh, 1992. Effect of leaf-blade and awn ongrain yield of rainfed wheat (Triticum aestivum). At different stages of spike development. Indian Journal of Agricultural Sciences 62 (7): 468-71.

[32] Olugbemi, L.B.; J. Bingham and R.B. Austin., 1976b. Ear and flag leaf photosynthesis of awned and awnless Triticum species Ann. Appl. Biol., 84, pp: 231-240.

[33] Qiang Yu1; Longhui Li1; Qunying Luo1; Derek Eamus ; Shouhua Xu; Chao Chen; Enli Wang; Jiandong Liu and David C., 2014. Year patterns of climate impact on wheat yield, Nielsen.International Journal of Climatology.Volume 34, Issue 2, pages 518–528.

INTERNATIONAL JOURNAL OF PLANT, ANIMAL AND ENVIRONMENTAL SCIENCES

ISSN 2231-4490

International Journal of Plant, Animal and Environmental Sciences