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Effect of Field Decomposition Period of Wheat Residues on Some Growth Characters and Yield of Corn (*Zea Mays* L.)

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ABSTRACT

The Effect of field decomposition period of wheat residues in some growing characters of corn was examined in Samaraa ,Salah- Aldin governorate in spring and autumn growing seasons 2016 . Three varieties (Fajir-1,Sarah,and Bagdhdad-3) and four decomposition periods (A1) control (without residues) (A2 , A3 , A4)decomposition period for 6,3 and 0 days before planting respectively were arranged in R.C.B.D with three replication in factorial experiment.

Emergence percentage, leaf area and dray weight (estimated two times), Net assimilation rate (N.A.R) and Crop Growth Rate (C.G.R) were recorded in both seasons.

Variety Baghdad-3 significantly surpass other varieties in emergence percentage at both seasons (97.80 , 92.91%) respectively , leaf area in spring first estimation(540.41 cm^2) and in autumn second estimation (4523.5 cm^2). varietiy Baghdad-3 obtained the lowest value in N.A.R and highest value in C.G.R.

No significant differences were observed among the effect of decomposition treatment in emergence percentage character .

A3 Decomposition treatment was significantly reduced leaf area to lowest value in spring first estimation and second fall estimation. In contrast A4 treatment suppressed leaf area in spring second estimation to lowest value.

A3 treatment had the greater allelopathic effect in fall season and reduced dry weight (second estimation) , N.A.R and C.G.R. to 77.89 gm, 1.552 gm.m^{-2}.day^{-1} ,13.798 gm. m^{-2}.day^{-1} respectively . A4 caused the most allelopathic effect in spring season to such characters (80.1 gm, 1.0253 gm. m^{-2}.day^{-1}, 10.660 gm. m^{-2}.day^{-1} respectively).

تأثير مدة التحلل الحقلي لمتبقيات الحنطة *Triticum aestivum* L. في بعض صفات نمو وحاصل الذرة الصفراء *Zea mays* L.

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الخلاصة

أجريت تجربة لدراسة تأثير مدة تحلل متبقيات الحنطة في بعض صفات نمو الذرة الصفراء في سامراء –محافظة صلاح الدين خلال الموسمين الربيعي والخريفي لعام 2016 . أجريت الدراسة في الموسمين في تجربة عامليه وزعت المعاملات فيهما بحسب تصميم القطاعات العشوائية الكاملة R.C.B.D في ثلاث مكررات . شملت كل تجربة ثلاثة أصناف من الذرة الصفراء (فجر–1 ، سارة، بغداد –3) مع ثلاث مدد للتحلل (0، 3، 6 أبوع قبل الزراعة) (A2 وA3 وA4) أضافة لمعاملة المقارنة (الزراعة بدون متبقيات). درست صفات النسبة المئوية للبزوغ والمساحة الورقية والوزن الجاف (في موعدين) وصافي البناء الضوئي ومعدل نمو المحصول. أظهرت النتائج تفوق التركيب الوراثي بغداد–3 في نسبة البزوغ في كلا الموسمين (97.80 و92.91 %) بالتتابع وفي المساحة الورقية في موعد القياس الأول للموسم الربيعي(540.41) سم^2 وموعد القياس الثاني للموسم الخريفي (4523.5) سم^2 .أعطى التركيب الوراثي بغداد–3 أقل قيمة في صافي البناء الضوئي وأعلى قيمة في معدل نمو

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المحصول . لم تؤثر مدد التحلل في النسبة المئوية للبزوغ معنويا في الموسمين. أعلى تأثير أليلوباثي لفترات التحلل كان للمعاملة A3 في الموسم الخريفي وخفضت قيم المساحة الورقية في موعد القياس الأول الربيعي وموعد القياس الثاني الخريفي إلى أقل قيمة. سجلت المعاملة A4 أقل قيمة للمساحة الورقية في موعد القياس الأول للموسم الخريفي . خفضت معاملة التحلل A3 في الموسم الخريفي معنويا الوزن الجاف في القياس الثاني وصافي البناء الضوئي ومعدل نمو المحصول إلى أقل قيم(77.89 غم و1.552 غم.م$^{-2}$.يوم$^{-1}$ و 3.798 غم.م$^{-2}$.يوم$^{-1}$). أعلى تأثير أليلوباثي في الموسم الربيعي كان للمعاملة A4 ،خفضت معنويا قيم الصفات إلى 80.3 غم و1.0253 غم.م$^{-2}$.يوم$^{-1}$ و10.660 غم.م$^{-2}$.يوم$^{-1}$.

Introduction:

Plant produced many secondary metabolites chemicals which effected growth and development of other biological system especially other plants and crops , by the allelopthic effects of these allelopthic secondary metabolites.

A common practice is that, after harvest, crop residues have been left on the surface of soil or incorporated into the soil . Crop plants residues may beneficially or antagonistically effect other plants through allelochemical compounds which may be released directly or indirectly from live or dead parts of plants and cause allelopathic effects depending on the amount of residues , Period of decomposition and concentration of allelopathic compounds.

Therefore allelopathy is known as the effect of plants on other plants in to the environment via evaporation , leaching , release from roots and decomposition of plant residues , which has synergic or antagonistic effects such as auto toxicity and isolation (Weih etal , 2008).

Corn is an important crop in Iraq . Corn seeds sown after wheat as a summer crop in rotation . Studies indicated that some varieties of wheat residues have allelopathic effect on other crops such an corn . Wheat may cause motivated or inhibitory effect on subsequent corn plants depending on residues concentration of allelopatic compounds , amount of residues , placement , Period and degree of decomposition and seasons environments (Opoku etal , etal ,1997 and Saffari etal 2010) .

The effect of wheat residues may be differed on corn growth and yield because of the genetic differences of corn genotypes , and according to the environments of growing season of corn crop especially temperature and rain (Garcia etal 1988 and Saffari etal , 2010).

Therefore the objective of this study was to investigate the allelopathic effects of different decomposition period of wheat residues on some growth characters of three subsequence corn genotypes hn spring and fall planting.

Materials and Methods: -

The study was conducted in growing season 2016 at the experimental field Samara – Salah-Aldin governorate . 9 t . ha^{-1} of wheat variety Sham -6 residues of previous season were added to each plot and incorporated with soil at 3 periods of decomposition , in addition to control (A1) (without residues). The periods of decomposition were 0 (A2) , 3 weeks (A3) and 6 weeks (A4) before planting . Certificated seeds of 3 corn varieties (Baghdad – 3 , Sarah and Fagir -1) from general institution of agricultural research Abu_Ghraib , were planted at 24/3 and 24/7/2016 . Seeds were planted in 3x4 plots with inter-row and inter plants spacing 75 and 25 cm respectively. A basal dose of 100 kg . ha^{-1} NPK fertilizer added at the time of planting (Alsahooki , 1990) and 120 kg . ha^{-1} N as urea added two times , half after 30 days of planting and other half at the flag leaf stage (Agriculture ministry , 2011)

Data recorded on : Emergence percentage after 14 days of planting :

E.P = $\frac{N0\ .of\ seedlings}{N0\ .of\ seed\ planted}$

leaf area : First estimated after 30 days from emergence and second estimated 40 days in spring season and 25 days in fall season after first estimating as average of leaf area of randomly 5 plants from each plot by using equation: leaf area (cm^2) = leaf length x leaf width x 0.75 (Sofi and Rether , 2007) .

Plant dry weight (gm) :After estimation of leaf area , dry weight of same 5 plants was recorded after dried in oven at 70 ^{0} until weight stabile .

Net Assimilation Rate : estimated according to (Essa , 1990)

N.A.R = $\frac{W2-W1}{T2-T1}$ X $\frac{lin\ LA2-lin\ LA1}{LA2-LA1}$

Crop growth Rate :- estimated according to Hunt (1982) .

C.G.R = $\frac{1}{CA}$ X $\frac{W2-W1}{T2-T1}$

Grain yield (t. ha^{-1}): At the appropriate stage of maturity , five plants were harvested from each plot and their average seed yield estimated at moisture percent 14% , then calculated as t. ha^{-1} .

The study was carried in Factorial experiment and treatments were arranged in Randomized Complete Blocks Design RCBD with three replications. All data were analyzed by ANOVA followed by LSD to compared between treatments averages (Steel and Torri , 1980) .

Results and Discussion :-

Emergence Percentage :-

It was observed that corn varieties had significant effect at both planting seasons on this character . As seen in Table (1) there were no significant difference between Baghdad-3 and Sarah in fall season . Baghdad-3 significantly surpass in both spring and fall seasons (97.80 , 92.91 %) respectively . The differences among varieties may due to the genetic differences among them , and to the different response of these varieties under the effect of wheat residues . The results indicated that Sarah and Fajir-1 genotypes were the most effected genotypes by the action of allelopathic compounds in wheat residues than Baghdad-3 genotype , which cause reduction in their emergence percentage . The same differences among genotypes had found by Torabi-Sirchi (2011). The results showed that there was no significant difference among decomposition period of wheat residues . Salih (2009) mentioned the same results , but Salih (2008) had found a significant effect of allelopathic compounds on corn seedling emergence . Interaction between genotypes and decomposition periods had on significant effect on emergence of corn seedling .

Table 1: Effect of wheat residue decomposition period in percentage of seedling emergence of three varieties of corn in spring and autumn seasons.

decomposition period (autumn)					decomposition period (spring)					
Average	A4	A3	A2	A1	Average	A4	A3	A2	A1	varietiess
78.33	77.03	75.96	72.86	87.46	89.36	89.16	86.63	92.90	88.73	Fajir 1
89.79	93.70	92.63	92.63	80.20	94.03	94.13	94.13	94.96	92.90	Sarah
92.91	94.33	93.70	93.70	89.53	97.80	97.90	97.06	98.73	97.50	Baghdad3
	88.49	87.43	86.40	85.73		93.73	92.61	95.53	93.04	Average
		interaction	periods	varieties			Interaction	Periods	varieties	LSD 0.05
		N.S	N.S	6.96			N.S	N.S	3.65	

Leaf area (cm^2) :

The effect of decomposition period on leaf area of three varieties of corn is presented in Table (2). The effect of genetic differences of varieties were significant on estimated leaf area after 30 days of emergence in spring planting season . In contrast, the significant effect of varieties in fall planting was at second estimation (after 25 days of first estimation) .varieties Baghdad – 3 had the significant highest values at these dates of estimation (540.41, 4523.5 cm^2**)** respectively. Javaid et al (2007) reported genetic variation against allelopathic stress which could be attributed to inherent differences among genotypes involved in physiological and morphological characters and their response to decomposition periods of wheat residues.

Corn plants grown in soil without wheat residues (control) tended to have greater leaf area values in both spring and autumn seasons and both estimating dates (576.6, 519.21) cm^2 and (5745.3, 4492.0) cm^2 respectively. Wheat residues significantly reduced leaf area in both seasons and both sampling dates except the first date in fall season (Table 2).

Table 2: Effect of wheat residues decomposition period in the leaf area (cm^2) for three varieties of corn in the spring and autumn seasons.

Average	Spring season									
	Second measurement					First measurement				
	A4	A3	A2	A1	Average	A4	A3	A2	A1	varieties
5196.1	5037.3	4985.3	5189	5573	515.58	494.6	489.3	515.3	563.0	Fajir 1
5220.1	4928.0	4962.3	5222	5768.3	512.16	486.0	484.6	500.0	578.0	Sarah
5308.3	4996.0	5056	5286.6	5894.6	540.41	523.0	512.6	536.0	589.3	Baghdad3
	4987.1	5001	5232.5	5745.3		501.4	495.5	517.1	576.6	Average
		Interaction	Periods	varieties			Interaction	Periods	varieties	LSD
		N.S	156.17	N.S			N.S	21.54	18.65	0.05
ر	Autumn Season									
	Second measurement					First measurement				
	A4	A3	A2	A1	Average	A4	A3	A2	A1	varieties
3842.75	3565.6	3608.3	3981.0	4216.0	488.7	488.33	472.67	509.00	484.80	Fajir 1
4231.4	4036.6	4067.3	4321.3	4500.3	489.06	451.33	513.00	468.93	522.97	Sarah
4523.5	4480.0	4380.0	4477.0	4759.6	502.41	468.67	465.33	525.77	549.87	Baghdad3
	4027.4	4018.5	4259.7	4492.0		469.44	483.67	501.23	519.21	Average
		Interaction	Periods	varieties			Interaction	Periods	varieties	LSD
		N.S	354.3	306.6			N.S	N.S	N.S	0.05

Treatment (A3) had the lowest values of leaf area in first measurement of spring growing season and second measurement at autumn season treatment . A4 cause the highest reduction in this character in second sampling of spring growing season .The result indicated that the allelopathic compounds released from wheat residues have significant effects on leaf area because these compounds reduced or suppressed cell division and elongation, inhibited enzymes activity, photosynthesis, and accumulation of chlorophyll and dry matter. These effects were reduced with increasing of decomposition period (Opoku and Voroney 1997, Yassin ,2014). No interaction between varieties and field analysis periods was found .

Dry weight (gm):-

Data regarding the effect of decomposition period on plant dry weight of three corn varieties is summarized in Table (3). The three varieties significantly differed in spring growing season. Baghdad-3 variety exceed other varieties in both measuring dates (0.18404, 99.15 gm) respectively. This superiority may due to the excellency high values of leaf area . Results similar to those of our study have been obtained by other researchers (Said , 2004).

The decomposition period significantly impact upon plant dry weight in second measuring in both growing season. The lowest values obtained in this character were in treatment A4 (80.1 gm) in spring season and A3 treatment (77.89 gm) in autumn season (Table 3).

The control treatment gave the highest values in both seasons . The wheat residues reduced dry weight of corn plants in compared with control . The short time of decomposition as in treatment A3 and A4 recorded the highest reduction in this character .The reduction of dry weight may be due to the effect of allelopathic compounds on leaf area (Table 1) , inhibition photosynthesis , formation of carbohydrates and proteins and accumulation of dry matter (Achrati at al 2005 , Yassin 2014). The long time of decomposition may reduce the concentration of allelopathic compound by the effect of temperature and water and reduced their effects on growing characters .

Net Assimilation rate (N.A.R):

The differences among varieties was not significant in spring season and significant in autumn season. Baghdad-3 gave the lowest value in this characters because his superiority in leaf area and their dry weight no significant with other two varieties , there for the N.A.R reduced in unit area .

There was no significant differences between A1 and A2 treatment in spring season . The value of N.A.R was significantly reduced to 1.0253 $gm.m^{-2}.day^{-1}$. In autumn season treatment A3 had the strong effect on N.A.R and caused significant reduction to 1.552 $gm.m^{-2}.day^{-1}$.

The allelopatic compound which released from wheat residues inhibited photosynthesis because their effects on chlorophyll , enzymes action and activation of photosynthesis in unit area of leaves , there for these effects tended to the reduction of N.A.R and this reduction incensed with the short of decomposition period .

These results was found also by other researchers (Troabi – Sirchi , 2011 , Nouri , at al , 2012) . No interaction have been found in this character .

Table 3: Effect of the wheat residues decomposition period in the dry weight (g) of three varieties of corn in the spring and autumn seasons.

Average	Spring season									
	Second measurement					First measurement				
	A4	A3	A2	A1	Average	A4	A3	A2	A1	varieties
86.16	79.3	78.0	92.0	95.3	0.14406	0.1364	0.1394	0.1401	0.1602	Fajir 1
87.08	80.0	79.0	94.0	95.3	0.16792	0.1636	0.1648	0.1677	0.1754	Sarah
94.15	81.0	86.3	97.3	112.0	0.18404	0.1737	0.1683	0.1796	0.2144	Baghdad3
	80.1	81.1	94.44	100.86		0.1579	0.1575	0.1625	0.1833	Average
		Interaction	Periods	varieties			Interaction	Periods	varieties	LSD 0.05
		N.S	6.78	5.87			N.S	N.S	0.0200	
Average	Autumn Season									
	Second measurement					First measurement				
	A4	A3	A2	A1	Average	A4	A3	A2	A1	varieties
83.667	88.83	76.83	78.66	90.33	0.14626	0.15107	0.12080	0.16033	0.15283	Fajir 1
91.875	86.50	78.50	90.00	112.50	0.17893	0.17313	0.18453	0.16263	0.19540	Sarah
85.167	79.66	78.33	88.66	94.00	0.16753	0.17610	0.16773	0.15090	0.17540	Baghdad3
	85.00	77.89	85.77	98.94		0.16677	0.15769	0.15796	0.17454	Average
		Interaction	Periods	varieties			Interaction	Periods	varieties	LSD 0.05
		N.S	11.88	N.S			N.S	N.S	N.S	

Table 4: Effect of wheat decomposition period in the net structure of photosynthesis $\times 10^{-3}$ g m^2. . Day $^{-1}$ of three varieties of yellow maize in spring and autumn seasons.

Average	decomposition period(Autumn)				decomposition period(Spring)					
	A4	A3	A2	A1	Average	A4	A3	A2	A1	varieties
1.749	1.905	1.650	1.550	1.890	1.0622	1.0110	1.0143	1.1353	1.0883	Fajir 1
1.765	1.758	1.550	1.723	2.030	1.0706	1.0410	1.0280	1.1636	1.0500	Sarah
1.473	1.491	1.456	1.335	1.611	1.1226	1.0240	1.0840	1.1703	1.2120	Baghdad3
	1.718	1.552	1.536	1.843		1.0253	1.0414	1.1564	1.1167	Average
		Interaction	Periods	varieties			Interaction	Periods	varieties	LSD 0.05
		N.S	N.S	0.250			N.S	0.09377	N.S	

Crop Growth Rate (C.G.R) :

variety Baghdad-3 significantly surpassed other varieties in spring growing season with average of C.G.R 12.350 $gm.g^{-2}.day^{-1}$. This result may due to significant thigh values of this variety in leaf area , dry weight and N.A.R. The results indicated that Baghdad-3 keep a good level of physical activates under the stress of allelopathic compounds. Decomposition periods significantly reduced C.G.R in both seasons. A4 treatment in spring and A3 treatment in autumn season reduced C.G.R to the lowest values (10.660 , 3.718) $gm.m^{-2}.day^{-1}$ respectively. (Table 4) . These two treatment had the lowest values because their effect on leaf area and Dry weight and N.A.R. The elongation of decomposition period reduce the effect of allelopathic compound in this character as in A2 treatment .

Table 5: Effect of wheat residues decomposition periods in crop growth rate of the crop gm 2. Day -1. For three varieties of maize in the spring and autumn seasons.

Average	decomposition Period(Autumn)				decomposition Period (Spring)					
	A4	A3	A2	A1	Average	A4	A3	A2	A1	varieties
14.833	15.735	13.607	13.956	16.032	11.469	10.559	10.381	12.247	12.689	Fajir 1
16.264	15.317	13.892	15.911	19.935	11.588	10.645	10.510	12.510	12.685	Sarah
15.11	14.131	13.895	15.735	16.679	12.530	10.776	11.488	12.955	14.903	Baghdad3
	15.061	13.798	15.201	17.549		10.660	10.793	12.571	13.426	Average
		Interaction	Periods	varieties			Interaction	Periods	varieties	LSD 0.05
		N.S	2.116	N.S			N.S	0.903	0.782	

Grain yield (t. ha^{-1}):

The yield shown in Table (6) indicated that there was no significant difference among varieties in grain yield, but the differences among decomposition periods were significant . The yield values shown are much lower in residues treatment in comparison with control. A1 treatment (without residues) recorded the highest value (8.037 , 9.764 $t.ha^{-1}$) in spring and autumn seasons respectively, while A3 and A4 treatments cause the highest stressful growing condition which reflect their negative effects on growing characters and guide to significant reduction in grain yield, which due to the effect of allelopathic materials on growth characters and yield compounds (Tables 2-6).

Table 5: Effect of wheat residues decomposition periods in grain yield (t.ha^{-1}) . For three varieties of maize in the spring and autumn seasons.

Average	decompositionPeriod (Autumn					decomposition Period (Spring)				
	A4	A3	A2	A1	Average	A4	A3	A2	A1	varieties
8.115	6.499	7.740	9.055	9.166	7.148	6.864	6.917	7.132	7.679	Fajir 1
9.096	8.856	8.330	8.704	10.435	7.372	6.960	7.135	7.308	8.084	Sarah
8.641	8.518	9.073	7.285	9.692	7.469	7.061	7.128	7.339	8.348	Baghdad3
	7.957	8.381	8.368	9.764		6.961	7.060	7.260	8.037	Average
		Interaction	Periods	varieties			Interaction	Periods	varieties	LSD 0.05
		N.S	1.206	N.S			N.S	0.695	N.S	

References:

Agriculture Ministry 2011. Field crop services Operation ,Soil , Fertilization , Irrigation, Seed rate . Conducting implication .

Ashrafi , Z . Y., S. Sadeghi, H.R. Mashhadi. And M.A. Hassan 2008. Allelopathic effects of Sunflower (*Helianthus annuus* L.) on germination and growth of wild Barley (*Hordeum Spontaneum* L.) . Jour .Agric. Tech. 4:219-229.

EL – sahooki . M. 1990. Yellow maize production and improvement. Ministry of Agriculture Higher Education and Scientific Research. Baghdad University . P. 216.

Garecia ,A.G. 1983. Seasonal variation in allelopathic effects of corn residues on corn and cress seedlings PH.D. Dissertation .Iowa state Univ. PP. 1—2.

Issa , T.A. 1990. Crop plant physiology. (Trane lated) PP. 496.

Hunt , R.1982. Plant growth analysis in biology. No 96 Edward Arnold (Pupl.) L.T.D London.

Javid , A., R.Bajwa , N. Rabbami and T. Anjum. 2007 . Comparative tolerance of rice (Oryza Sativa L.) genotypes to purple nutsedge (*Cyperus Rotunduse* L.) allelopathy . Allelopathy journal . 20: 157-166 .

Nouri ,H.,Z.A. Talab and A ,Tavassoil . (2012). Effects of weed Allelopathic Of (*sorghum halepense*) on germination and seedling growth of Wheat ,Alv and cultivar .Annals of Biol .Res .3(3) 1283-1293

Opoku , G.,T.J.V yn and R.P . Voroney (1997). Wheat straw placement effects on total phenolic compounds in soil and corn seedling growth .Can .J. plant Sci. 77:301-305.

Saffari , M.,V.R. Saffari , and M.H.Torabi-Sirchi.(2010) . Allelopathic appraisal effects of straw extract wheat varieties on th growth of corn. African Jour. plant Sci .4(11) 427-432.

Saffari , M., M.H. Torubi –Sirchi , (2011). Allelopathic Effect of straw Extract from two Native Iranian wheat varieties on the growth of two corn varieties (single cross 647 and 704) . American – Eurasian J.Agric. Environ .Sci . 10(2) 133-139.

Said , J . A . 2004. Response of some durum wheat varities to plant secretion of Barley *Hordeum distichum* L. Iraqi Jour . of Agri . Sci : 5: 94-101.

Salih ,S.M. 2008. Allelopathic effort of Rhizomes long and growth stage of sorghum halepense in germination ,growth and yield of corn. Tikrit jour .Agri. Sci 8(3).

Salih ,M.A 2009. Effect of allelopathy of some kind of winter weeds on germination and growth of *Triticum aestivum* and Zea *mays* L. MS.C. Thesis. Colloge of Agriculture. Tikrit University.

Sofi , R . and Rather , A . G .2007 . Studies on genetic variability correlation and path analysis in maize (zea mays L.) International Jiur . of Agri .sci. 3(2) : 290-29.

Stell , R.G.D. and J.H. Torri 1980 . Principles and Procedures of statistics .2nd ed. Mecraw-Hill Company , Inc , London.

Weih , M. Didon , U.M.E , Ronnberg – Wastliung ,A.C. and Bjorkman ,C. 2008. Integrated agricultural research and crop breeding :Allelopathic weedcontrol in cereals and long-term productivity in perennial biomass crops. Agr. Syst . 97: 99-107 .

Yaseen ,Y, A. 2014. Effect of agricultural types and residuals of corn (*Zea mays* L.) in some growth traits ,yield and its components of bread wheat (*Triticum aestivum* L.) . Ms.c Thesis. College of agriculture – Tikrit University .