دراسة مقاومة أصناف من القمح المخزون لنمو بعض الفطريات ونتاج السموم

سهام سعد، محمد جميل الجبوري، إيوان غانم وموفق محمود المشهدي

(1) المركز الدولي للبحوث الزراعية في المناطق الجافة، إكادير، خليج خليج، دولة المغرب.
(2) كلية الزراعة، جامعة تكنولوجيا، العراق.
(3) الوكالة الدولية للطاقة الذرية، دمشق، سوريا.
(4) كلية الزراعة والغذاء، جامعة الموصل، الموصل، العراق.

الملخص


Aspergillus ochraceus و Fusarium moniliforme Aspergillus parasiticus

وقد قام الباحثون بدراسة مدى مقاومة بعض أصناف القمح لمسموم الفطريات A. ochraceus و A. parasiticus بناءً على التحليلات المخبرية والتقديرات الإحصائية. حيث تم تقييم نمو الفطريات F. moniliforme و A. parasiticus من مجموعات G1 و G2 بمقابلة بعض العوامل المحيطة بهما. وقد تم العثور على أن الفطريات A. ochraceus و A. parasiticus لديها مقاومة أثرية ضد بعض السموم الفطرياتية مثل A. ochraceus.

العوامل الأحيائية مثل سالسية القمح والداخل الميكروبي للقمح، تؤثر على النمو ونتاج الفطريات. تؤثر على النمو ونتاج الفطريات A. ochraceus و A. parasiticus بناءً على التحليلات المخبرية والتقديرات الإحصائية. حيث تم العثور على أن الفطريات A. ochraceus و A. parasiticus لديها مقاومة أثرية ضد بعض السموم الفطرياتية مثل A. ochraceus.

الخلاصة

بعد القمح من أهم محاصيل الحبوب وأكثرها زراعة ونتج توقعات قوية إلى ارتفاع نسبة الفطريات في القمح. كما بعض التشويقات بين الفطريات من الفطريات A. ochraceus و A. parasiticus بناءً على التحليلات المخبرية والتقديرات الإحصائية. حيث تم العثور على أن الفطريات A. ochraceus و A. parasiticus لديها مقاومة أثرية ضد بعض السموم الفطرياتية مثل A. ochraceus.

العوامل المحيطة مثل سالسية القمح والداخل الميكروبي للقمح، تؤثر على النمو ونتاج الفطريات. تؤثر على النمو ونتاج الفطريات A. ochraceus و A. parasiticus بناءً على التحليلات المخبرية والتقديرات الإحصائية. حيث تم العثور على أن الفطريات A. ochraceus و A. parasiticus لديها مقاومة أثرية ضد بعض السموم الفطرياتية مثل A. ochraceus.

الخلاصة

بعد القمح من أهم محاصيل الحبوب وأكثرها زراعة ونتج توقعات قوية إلى ارتفاع نسبة الفطريات في القمح. كما بعض التشويقات بين الفطريات من الفطريات A. ochraceus و A. parasiticus بناءً على التحليلات المخبرية والتقديرات الإحصائية. حيث تم العثور على أن الفطريات A. ochraceus و A. parasiticus لديها مقاومة أثرية ضد بعض السموم الفطرياتية مثل A. ochraceus.

الخلاصة

بعد القمح من أهم محاصيل الحبوب وأكثرها زراعة ونتج توقعات قوية إلى ارتفاع نسبة الفطريات في القمح. كما بعض التشويقات بين الفطريات من الفطريات A. ochraceus و A. parasiticus بناءً على التحليلات المخبرية والتقديرات الإحصائية. حيث تم العثور على أن الفطريات A. ochraceus و A. parasiticus لديها مقاومة أثرية ضد بعض السموم الفطرياتية مثل A. ochraceus.

الخلاصة

بعد القمح من أهم محاصيل الحبوب وأكثرها زراعة ونتج توقعات قوية إلى ارتفاع نسبة الفطريات في القمح. كما بعض التشويقات بين الفطريات من الفطريات A. ochraceus و A. parasiticus بناءً على التحليلات المخبرية والتقديرات الإحصائية. حيث تم العثور على أن الفطريات A. ochraceus و A. parasiticus لديها مقاومة أثرية ضد بعض السموم الفطرياتية مثل A. ochraceus.
مواد البحث وطريقة

nfتت هذه الدراسة خلال موسمي 2005 و2006 في المركز الدولي
للبحث الزراعي في المناطق الجافة (أيكردا)، حلب، سورية.

الاستانف

استخدم تانانيا أصناف من القمح الطربي
("Triticum aestivum"") غريب، وأرحة، طبيعية، العرق، الزع، إنتصار، فانتوم، وتميز (3)
حيث تم الحصول عليها من الهيئة العامة لتصنيف البذور وهمية
tكنولوجيا البذور المحفظة في نينوى وصلاح الدين في العراق.

الفطور المنتجة للسوسوم

Aspergillus
Aspergillus NRRL 3174, parasticus NRRL 2999
والتي تم
Fusarium moniliforme MRC 862 و
الحصول عليها من قسم علم الأغذية والفنانات الأحيائية، كلية
الزراعة، جامعة كركوك، حيث تم تمثيلها ضمن أنواع اختبار
(MEA) Malt Extract Agar
مستقبل مستقل أجر مولت
ثم
وحذفت أنثوب الاختبار هذه عند درجة 27±2 درجة حرارة
وحذفت في الثلاثة بعد درجة 4 درجة حرارة

تحضير الفطور البوغي

تم تحضير المستعمرات الفطرية لكل عزلة بدأً من بوغا واحدة،
وتمت الفطور على مستنبت MEA
وتمت الحقول على مستنبت
وتمت القمك على مستنبت
وتمت القمك على مستنبت
وتمت القمك على مستنبت
وتمت القمك على مستنبت
وتمت القمك على مستنبت
وتمت القمك على مستنبت
وتمت القمك على مستنبت

العوامل الإصطناعية

وضعت عيانات بوزن 50 مل من كل صنف في دور سصيري
زراعي مساحة 500 مل وكمي به إبها الماء المقتشر والمحم
حتى وصلت الرطوبة إلى 35% بالنسبة للحروب التي نص عليها
كامل الفطور
وقدت
A. ochraceus و
A. parasticus
وقدت
كل من الفطور
باستخدام قياسات الرطوبة الخاصة، بينما أضيف 50 مل
من الماء المقتشر والمحم إلى الحروب التي نص عليها
القمح
Table 1. Arkestrol and Aflatoxin (B1 - B2 - G1, G2) concentrations (microgram/gram) produced by Aspergillus parasiticus.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aspergillus parasiticus</strong></td>
<td>156.95±2.45</td>
<td>110.00±4.40</td>
<td>74.60±2.00</td>
<td>32.60±2.20</td>
<td>74.60±2.00</td>
<td>32.60±2.20</td>
<td>32.60±2.20</td>
<td>32.60±2.20</td>
<td>74.60±2.00</td>
<td>32.60±2.20</td>
<td>32.60±2.20</td>
<td>74.60±2.00</td>
<td>32.60±2.20</td>
<td>32.60±2.20</td>
</tr>
</tbody>
</table>

Values followed by the same letter in the same column are not significantly different according to Duncan multiple range test at P=0.05.
Aspergillus ochraceus

Table 3: Ochratoxine and Ergosterol 1 concentrations (microgram/gram) produced by Aspergillus ochraceus grown on wheat seed.

<table>
<thead>
<tr>
<th>Ochratoxine concentration (µg/g)</th>
<th>Ergosterol concentration (µg/g)</th>
<th>Bread Wheat Varieties</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.37±0.23 ab</td>
<td>46.40±1.60 c</td>
<td>Abu-Ghraib</td>
</tr>
<tr>
<td>2.53±0.24 d</td>
<td>133.45±3.05 a</td>
<td>Waha</td>
</tr>
<tr>
<td>5.00±0.13 b</td>
<td>58.40±1.10 d</td>
<td>Latifa</td>
</tr>
<tr>
<td>3.51±0.13 c</td>
<td>76.90±1.10 cd</td>
<td>Alraq</td>
</tr>
<tr>
<td>2.97±0.13 d</td>
<td>83.45±1.30 c</td>
<td>Tamooze 3</td>
</tr>
<tr>
<td>5.79±0.03 a</td>
<td>39.95±0.45 c</td>
<td>Hashimieha</td>
</tr>
<tr>
<td>3.44±0.22 c</td>
<td>80.00±0.60 c</td>
<td>Alaaz</td>
</tr>
<tr>
<td>2.71±0.18 c</td>
<td>102.15±5.55 b</td>
<td>Entisar</td>
</tr>
<tr>
<td>3.92</td>
<td>77.59</td>
<td>ان시스템</td>
</tr>
<tr>
<td>2.75</td>
<td>65.67</td>
<td>أفل فرق معيونى عند مستوى احتمال 5%</td>
</tr>
</tbody>
</table>

LSD at P=0.05

Values followed by the same letter in the same column are not significantly different according to Duncan multiple range test at P=0.05

The results indicate a significant difference between the mean concentrations of ochratoxin A and ergosterol in wheat varieties. The highest concentration of ochratoxin was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

Table 2: Ergosterol and Fumonisin concentrations (microgram/gram) produced by Fusarium moniliforme

<table>
<thead>
<tr>
<th>Fumonisin concentration (µg/g)</th>
<th>Ergosterol concentration (µg/g)</th>
<th>Bread Wheat Varieties</th>
</tr>
</thead>
<tbody>
<tr>
<td>61.19±0.67 c</td>
<td>116.80±4.00 a</td>
<td>Abu-Ghraib</td>
</tr>
<tr>
<td>68.47±0.88 d</td>
<td>112.65±9.25 a</td>
<td>Waha</td>
</tr>
<tr>
<td>73.97±0.78 c</td>
<td>82.15±1.35 c</td>
<td>Latifa</td>
</tr>
<tr>
<td>83.85±1.00 a</td>
<td>57.55±4.30 a</td>
<td>Alraq</td>
</tr>
<tr>
<td>84.25±1.25 a</td>
<td>52.95±1.45 f</td>
<td>Tamooze 3</td>
</tr>
<tr>
<td>77.63±0.47 b</td>
<td>64.00±1.90 d</td>
<td>Hashimieha</td>
</tr>
<tr>
<td>84.00±0.30 a</td>
<td>56.70±1.40 e</td>
<td>Alaaaz</td>
</tr>
<tr>
<td>71.96±0.45 c</td>
<td>93.10±1.60 b</td>
<td>Entisar</td>
</tr>
<tr>
<td>19.28</td>
<td>59.15</td>
<td>أفل فرق معيونى عند مستوى احتمال 5%</td>
</tr>
</tbody>
</table>

LSD at P=0.05

Values followed by the same letter in the same column are not significantly different according to Duncan multiple range test at P=0.05

The results show a significant difference between the mean concentrations of fumonisin B1 and ergosterol in wheat varieties. The highest concentration of fumonisin B1 was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results of the study indicate a significant difference between the mean concentrations of ochratoxin A and ergosterol in wheat varieties. The highest concentration of ochratoxin was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results show a significant difference between the mean concentrations of fumonisin B1 and ergosterol in wheat varieties. The highest concentration of fumonisin B1 was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results indicate a significant difference between the mean concentrations of ochratoxin A and ergosterol in wheat varieties. The highest concentration of ochratoxin was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results show a significant difference between the mean concentrations of fumonisin B1 and ergosterol in wheat varieties. The highest concentration of fumonisin B1 was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results indicate a significant difference between the mean concentrations of ochratoxin A and ergosterol in wheat varieties. The highest concentration of ochratoxin was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results show a significant difference between the mean concentrations of fumonisin B1 and ergosterol in wheat varieties. The highest concentration of fumonisin B1 was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results indicate a significant difference between the mean concentrations of ochratoxin A and ergosterol in wheat varieties. The highest concentration of ochratoxin was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results show a significant difference between the mean concentrations of fumonisin B1 and ergosterol in wheat varieties. The highest concentration of fumonisin B1 was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results indicate a significant difference between the mean concentrations of ochratoxin A and ergosterol in wheat varieties. The highest concentration of ochratoxin was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results show a significant difference between the mean concentrations of fumonisin B1 and ergosterol in wheat varieties. The highest concentration of fumonisin B1 was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results indicate a significant difference between the mean concentrations of ochratoxin A and ergosterol in wheat varieties. The highest concentration of ochratoxin was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results show a significant difference between the mean concentrations of fumonisin B1 and ergosterol in wheat varieties. The highest concentration of fumonisin B1 was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results indicate a significant difference between the mean concentrations of ochratoxin A and ergosterol in wheat varieties. The highest concentration of ochratoxin was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results show a significant difference between the mean concentrations of fumonisin B1 and ergosterol in wheat varieties. The highest concentration of fumonisin B1 was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results indicate a significant difference between the mean concentrations of ochratoxin A and ergosterol in wheat varieties. The highest concentration of ochratoxin was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results show a significant difference between the mean concentrations of fumonisin B1 and ergosterol in wheat varieties. The highest concentration of fumonisin B1 was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results indicate a significant difference between the mean concentrations of ochratoxin A and ergosterol in wheat varieties. The highest concentration of ochratoxin was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results show a significant difference between the mean concentrations of fumonisin B1 and ergosterol in wheat varieties. The highest concentration of fumonisin B1 was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results indicate a significant difference between the mean concentrations of ochratoxin A and ergosterol in wheat varieties. The highest concentration of ochratoxin was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results show a significant difference between the mean concentrations of fumonisin B1 and ergosterol in wheat varieties. The highest concentration of fumonisin B1 was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results indicate a significant difference between the mean concentrations of ochratoxin A and ergosterol in wheat varieties. The highest concentration of ochratoxin was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

The results show a significant difference between the mean concentrations of fumonisin B1 and ergosterol in wheat varieties. The highest concentration of fumonisin B1 was found in Abu-Ghraib wheat, while the lowest was in Alraq wheat. The same trend was observed for ergosterol, with the highest concentration in Tamooze 3 and the lowest in Alraq.

Asaad, S., M.J. Al-Jubory, I. Ghanem and M.M Al-Mashehadani. 2010. Response of Wheat Genotypes to Storage ochratoxin produced by wheat genotypes was also assessed: aflatoxins B1, B2, G1, and G2 produced by A. parasiticus, A. ochraceus and F. moniliforme. Assessment of fungal growth using ergosterol test showed that wheat genotype Tammoz 3 was most effective in inhibiting the growth of A. parasiticus and F. moniliforme, while genotype Hashimia was the most resistant to the growth of A. ochraceus. Inhibition of aflatoxin B1, B2, G1, and G2 and fumonisin production was highest (P= 0.05) with wheat genotype Abu-Ghraib, while genotype Al-waha was the most resistant to production of ochratoxin compared to the other genotypes.

Keywords: Wheat, aflatoxins, fumonisins, ochratoxins.

Corresponding author: Siham Asaad, ICARDA, P.O. Box 5466, Syria, Aleppo, Syria, Email: s.asaad@cgiar.org

Abstract


The response of wheat genotypes to storage fungi and their associated mycotoxins was investigated. Eight wheat genotypes were evaluated for their susceptibility to Aspergillus parasiticus, A. ochraceus and Fusarium moniliforme. Production of mycotoxins on the eight wheat genotypes was also assessed: aflatoxins B1, B2, G1, and G2 produced by A. parasiticus, fumonisins produced by F. moniliforme, and ochratoxin produced by A. ochraceus. Assessment of fungal growth using ergosterol test showed that wheat genotype Tammoz 3 was most effective in inhibiting the growth of A. parasiticus and F. moniliforme, while genotype Hashimia was the most resistant to the growth of A. ochraceus. Inhibition of aflatoxin B1, B2, G1, and G2 and fumonisin production was highest (P= 0.05) with wheat genotype Abu-Ghraib, while genotype Al-waha was the most resistant to production of ochratoxin compared to the other genotypes.

Keywords: Wheat, aflatoxins, fumonisins, ochratoxins.

Corresponding author: Siham Asaad, ICARDA, P.O. Box 5466, Syria, Aleppo, Syria, Email: s.asaad@cgiar.org

References


Received: January 12, 2009; Accepted: May 6, 2010