تغيرات سيتولوجية مستحدثة بوساطة فيوزيلاد وهربستوب في نبات الفول

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عوملت جذور بادرات الفول عمر ١٠ أيام بكل من الفيوزيلاد والهربستوب وبتركيزات خمسة (١٠ ـ ٥٠ ـ ١٠٠ ـ ٣٠٠ و٥٠٠ جزء في المليون)، حيث عرضت الجذور للتركيزات السابقة لفترات مختلفة، وهي ١، ٢، ٣، ٤، ٥، و٢٤ ساعة. استخدمت طريقة الاسيتوكارمن لتحضير الشرائح؛ قدرت كل من نسب الانقسام الميتوزي وأدوار الانقسام المختلفة، والشذوذ الكروموسومي الكلي ونسبة كل نوع. أظهرت النتائج أن مبيدي الحشائش المستعملين لهما تأثير على كل من نسبة الانقسام الميتوزي ونسبة أدواره المختلفة، كما أنتجتا شذوذ كروموسومية في جميع الحالات وهي: كروموسومات متلكئة، جسور كروماتيدية، خلايا ذات نواتين، دور استوائي يشبه المستحدث بالكولشيسين، خلايا ثلاثية الأقطاب، خلايا عديدة المجموعة، شظايا كروموسومية، وتكتل والتصاق الكروموسومات. وقد ظهرت جميع الشذوذ خلال الساعات الخمس الأولى. ويمكن تعليل ظهورها بأنها نتيجة تأثير المبيدات على توقف الدور الاستوائي من المرور إلى الدور الانفصالي، وتسمم المغزل، ومنع السيتوبلازم من الانقسام، وكسر الكروموسومات وتغير في تركيبها الكيميائي. وتظهر النتائج إمكانية استعمال هذين المبيدين للحشائش كمطفرات كيميائية.

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Cytological Alterations Induced by Fusilade and Herbstop in *Vicia faba* L.

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Intact seedlings of ten days old *Vicia faba* L. were treated with fusilade and herbstop in 5 concentrations: 10, 50, 100, 300 and 500 ppm. Root samples were examined after different intervals. The two herbicides affected mitotic activity, mitotic stages and produced chromosomal aberrations with different percentages in root-tips of *Vicia faba* L. The two herbicides increased metaphase frequency in all treatments. Abnormalities produced were laggards, bridges, C-metaphase, tripolar nuclei, polyploidy cells, fragments, binucleate cells and stickiness of chromosomes. The abnormalities appeared during 5 hours after the beginning of the experiment. These cytological alterations can be explained as a result of arresting metaphase, spindle poisoning, inhibition of cytokinesis, chromosome breakage and changing of chromatin chemical compositions. The results suggested possible mutagenic potential of the two herbicides.

The increasing use of chemicals in both agriculture and industry nowadays, expose man to genetic damage that might occur by chemical mutagens. The Environmental Mutagen Society was founded in 1969 and was concerned about the potential genetic impact associated with the increasing of chemicals in the environment (Brusick 1980). A committee of the society has published a review including different biological system that have been employed to detect genetic damage that is caused by chemicals either by gene mutation or chromosome aberrations (Committee 17, 1975). Plants are used as one of these systems to demonstrate mutagenecity of chemicals through studying chromosome aberrations. Many investigators have tested mutagenecity of herbicides in plants. (Lingowski and Scott, 1972, Sikka and Sharma, 1976, Oku, 1978, Khosla and Dnyansagar, 1980, Furedi *et al.*, 1981, Njagi and Gopalan, 1981, Najchevska *et al.*,

1981, Al-Najjar *et al.*, 1982, Badr *et al.*, 1983, Shahin, 1985, Shahin and Elzahrany, 1985 and others).

Fusilade and herbstop are two herbicides used in Saudi Arabia. Fusilade, formerly PP009 containing fluazifop-buty1 is a new selective post-emergence herbicide that control annual and perennial grass weeds without harming broad leaved crops. Herbstop is a relatively new herbicide that reportedly controls a very broad spectrum of weed species. Few work have been published on the cytological alterations induced by the later herbicide in plants (Boyle and Evans, 1974, and Goltenbath, 1979).

The aim of this investigation is to test mutagenecity of the last two herbicides in plant through studying their cytological effects.

Materials and Methods

Vicia faba L. variety Giza was used in this investigation. The two herbicides fusilade (Butyl 2- [4-5-trifluoromethy1-2-pyridyloxy phenoxy] propionate) and herbstop (N-phosphonomethy glycine) were used in 5 different concentrations: 10, 50, 100, 300 and 500 ppm. Seedlings 8 – 10 days old were treated, under cotyledon level, with the two chemicals for 1, 2, 3, 4, 5 and 24 hr. A control set for each interval was treated with distilled water. All treatments were done under constant temperature: 20°C, and in the dark. Samples from lateral roots were fixed in glacial acetic acid: ethyl alcohol (1:3) and stored in the freezer. A mixture of 1 ml of 1N HC1 and 9 ml of 2% acetocarmin was used to hydrolize the material at 60°C for 15 min. and 2% acetocarmin was used for staining. Observations were taken about mitotic index (ratio of the total number of normal dividing cells to the total number of normal cells examined (Badr *et al.*, 1972). Frequency of mitotic phases and chromosomal aberrations were estimated. From 1000 to 1391 cells were examined in 5 slides for each treatment. For statistical analysis the differences between treatments and the control were compared with critical values for test involving a difference of two propertions (Brase and Brase, 1978).

Results

The mitotic index, frequency of mitotic phases and frequency of chromosomal aberrations in root-tips of *Vicia faba* L. treated with fusilade and herbstop are given in Tables 1 – 6.

The data indicate that fusilade reduced the mitotic index significantly after 1, 2, 3, 4 and 5 hr. treatments in all concentrations used (Table 1). The minimum