

THE USE OF NEW PLANT GROWTH REGULATORS METHYUR, KAMETHUR AND IVIN TO INCREASE THE PRODUCTIVITY OF SORGHUM

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Introduction. Sorghum is one of the most important food, fodder and technical crops grown in the world [1, 2]. Global climate change and environmental pollution with toxic industrial and agricultural waste are the most unfavorable environmental factors affecting the growth and development of sorghum, which leads to a decrease in product quality [1, 2]. The purpose of this work is to study the effect of new plant growth regulators Methyur, Kamethur and Ivin on growth and productivity of various cultivars of grain sorghum (*Sorghum bicolor* (L.) Moench) and sweet sorghum (*Sorghum saccharatum* (L.) Moench) grown in the field conditions.

Materials and methods. Field experiments were carried out on grain sorghum (*Sorghum bicolor* L.) cv. Yarona, and sweet sorghum (*Sorghum saccharatum* L.) cv. Favorite. Before sowing, sorghum seeds were superficially sterilized with 1% KMnO₄ solution for 15 min., washed three times with sterile distilled water, and then soaked in distilled water (control) or water solutions of any plant growth regulators: Methyur, Kamethur or Ivin, used in concentration 10⁻⁷M for 24 hours (experiment). After this procedure, the treated seeds were dried and planted in the soil. Statistical analysis of growth parameters: the average length of root (in mm) and the average fresh weight of plant (in gram) of sorghum grown for 2 month in the field, and productivity parameters: the average panicle length (in cm) and the average fresh weight of grain (in gram) of sorghum grown for 4 month in the field was carried out according to the guidelines [2].

New plant growth regulators Methyur and Kamethur (derivatives of sodium and potassium salts of 6-methyl-2-mercapto-4-hydroxypyrimidine) and Ivin (N-oxide-2,6-dimethylpyridine) were synthesized in the Department for Chemistry of Bioactive Nitrogen-Containing Heterocyclic Compounds, V. P. Kukchar Institute of Bioorganic Chemistry and Petrochemistry of the National Academy of Sciences of Ukraine (Figure 1).

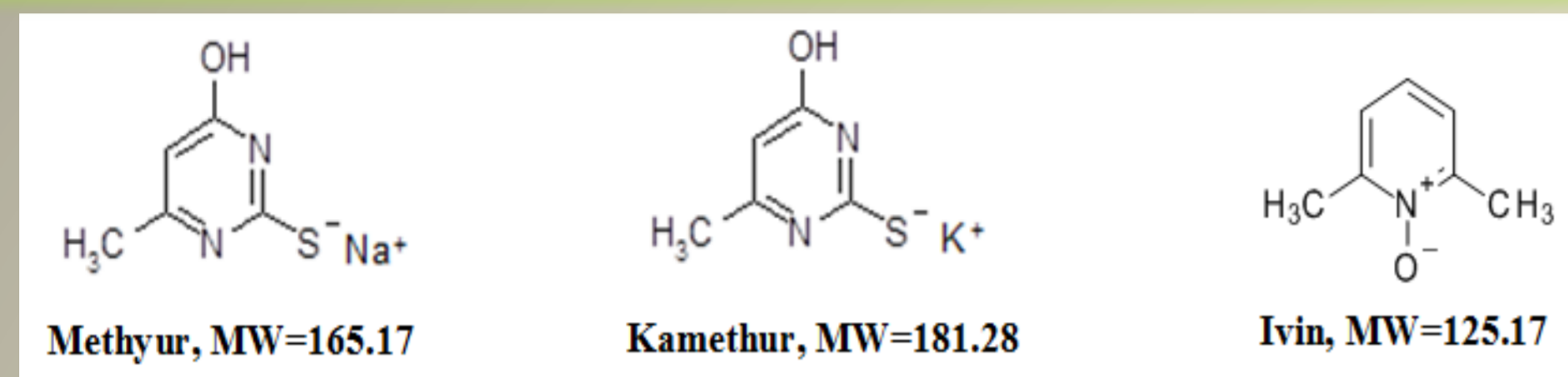


Figure 1. Chemical structure and relative molecular weight of Methyur, Kamethur and Ivin

Results. Effect of Methyur, Kamethur and Ivin on growth parameters of sorghum. The results of field studies showed that the growth parameters of grain sorghum (*Sorghum bicolor* (L.) Moench) cv. Yarona exceeded that of control plants (Figure 2, A, B and C). The average length of root increased as follows: by 15% - in plants obtained from seeds soaked in Kamethur, by 14% - in plants obtained from seeds soaked in Methyur, by 29% - in plants obtained from seeds soaked in Ivin, compared to the control. The average fresh weight of plant increased as follows: by 67% - in plants obtained from seeds soaked in Kamethur, by 53% - in plants obtained from seeds soaked in Methyur, by 21% - in plants obtained from seeds soaked in Ivin, compared to the control.

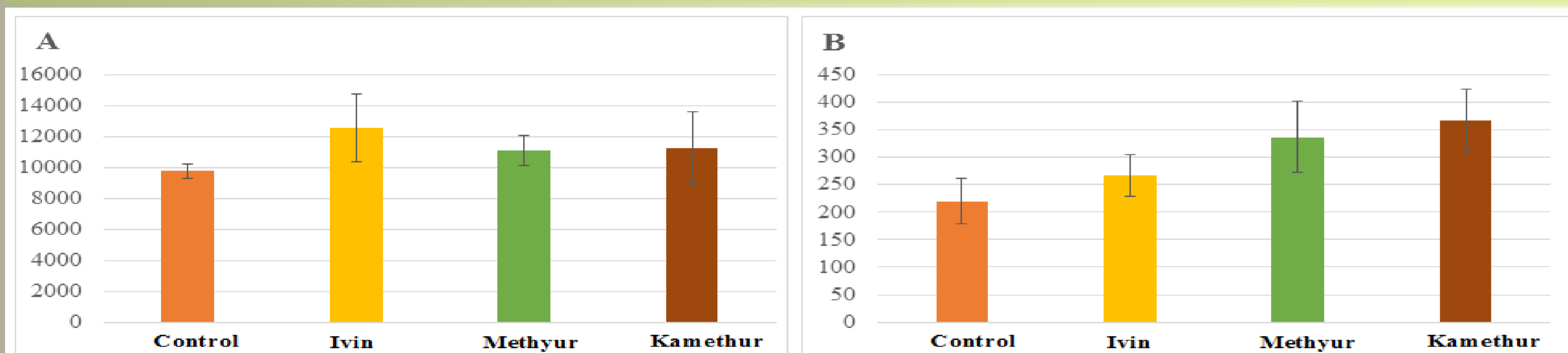


Figure 2. The growth parameters of grain sorghum (*Sorghum bicolor* (L.) Moench) cv. Yarona grown for 2 month in the field: A - the average length of root (in mm), B - the average fresh weight of plant (in gram), C - sorghum roots

The growth parameters of experimental sweet sorghum (*Sorghum saccharatum* (L.) Moench) cv. Favorite exceeded that of control plants (Figure 3, A, B and C). The average length of root increased as follows: by 20% - in plants obtained from seeds soaked in Kamethur, by 40% - in plants obtained from seeds soaked in Methyur, by 25% - in plants obtained from seeds soaked in Ivin, compared to the control. The average fresh weight of plant increased as follows: by 7% - in plants obtained from seeds soaked in Kamethur, by 57% - in plants obtained from seeds soaked in Methyur, by 30% - in plants obtained from seeds soaked in Ivin, compared to the control.

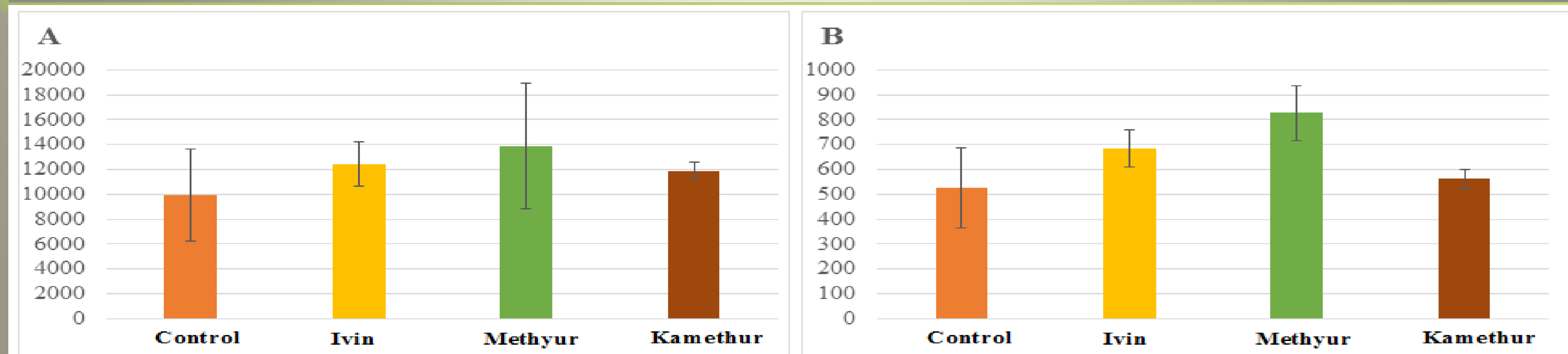


Figure 3. The growth parameters of sweet sorghum (*Sorghum saccharatum* (L.) Moench) cv. Favorite grown for 2 month in the field: A - the average length of root (in mm), B - the average fresh weight of plant (in gram), C - sorghum roots

Effect of Methyur, Kamethur and Ivin on productivity of sorghum. The results of field studies showed that the productivity parameters of grain sorghum (*Sorghum bicolor* (L.) Moench) cv. Yarona exceeded that of control plants (Figure 4, A, B and C). The average length of the panicle increased as follows: by 7% - in plants obtained from seeds soaked in Kamethur, by 20% - in plants obtained from seeds soaked in Methyur, by 17% - in plants obtained from seeds soaked in Ivin, compared to the control. The average fresh weight of grain increased as follows: by 22% - in plants obtained from seeds soaked in Kamethur, by 26% - in plants obtained from seeds soaked in Methyur, by 13% - in plants obtained from seeds soaked in Ivin, compared to the control.

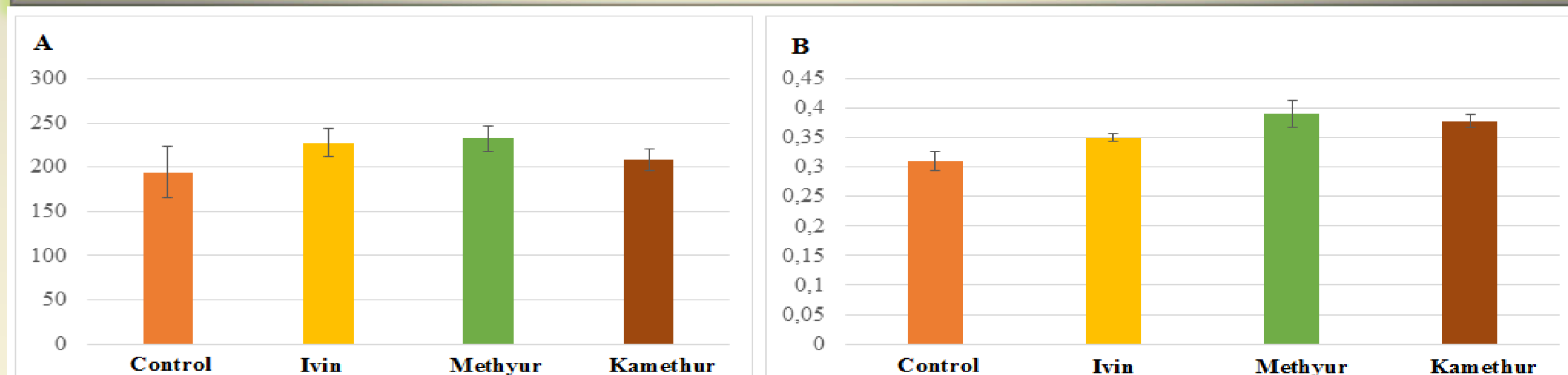


Figure 4. The productivity parameters of grain sorghum (*Sorghum bicolor* (L.) Moench) cv. Yarona grown for 4 month in the field: A - the average panicle length (in cm), B - the average fresh weight of grain (in gram), C - panicles with sorghum grains

The productivity parameters of experimental sweet sorghum (*Sorghum saccharatum* (L.) Moench) cv. Favorite exceeded that of control plants (Figure 5, A, B and C). The average length of the panicle increased as follows: by 36% - in plants obtained from seeds soaked in Kamethur, by 37% - in plants obtained from seeds soaked in Methyur, by 25% - in plants obtained from seeds soaked in Ivin, compared to the control. The average fresh weight of grain increased as follows: by 24% - in plants obtained from seeds soaked in Kamethur, by 38% - in plants obtained from seeds soaked in Methyur, by 35% - in plants obtained from seeds soaked in Ivin, compared to the control.

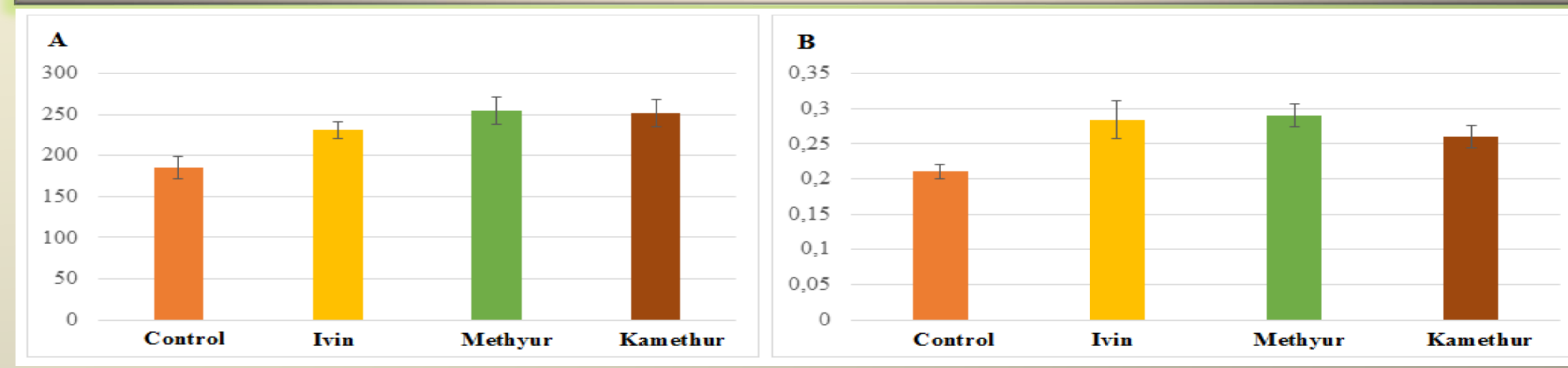


Figure 5. The productivity parameters of sweet sorghum (*Sorghum saccharatum* (L.) Moench) cv. Favorite grown for 4 month in the field: A - the average panicle length (in cm), B - the average fresh weight of grain (in gram), C - panicles with sorghum grains

Conclusions. The results of field studies confirmed the possibility of practical use of new plant growth regulators Methyur, Kamethur and Ivin to improve sorghum growth and productivity.

References.

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