Asian Journal of Chemistry; Vol. 25, No. 12 (2013), 6995-6996

ASIAN JOURNAL OF CHEMISTRY

http://dx.doi.org/10.14233/ajchem.2013.15669

NOTE

Synthesis and Characterization of Various Xanthates and Their Effects on Germination and Early Seedling Growth in Wheat (*Triticum aestivum* L.)

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(*Received*: 1 March 2013; *Accepted*: 10 June 2013) AJC-13622

Potassium *n*-propyl xanthate potassium *iso*-propyl xanthate, potassium *n*-butyl xanthate and potassium *iso*-butyl xanthate were synthesized and characterized by melting point, elemental analysis and infrared spectra and their effect on germination and early seedling growth in wheat (*Triticum aestivum* L.) were studied. All chemical treatments decreased per cent germination length and dry weight of shoots decreased at all concentrations except at 5 and 10 ppm *n*-propyl xanthate. Root length also decreased except at 5,10 and 25 ppm of potassium *iso*-propyl xanthate and potassium *iso*-butyl xanthate, root dry weight decreased with all chemical treatments except at 5 and 10 ppm in case of potassium *n*-butyl xanthate.

Key Words: Xanthate, Wheat.

Reactions of plants to exogenously applied chemicals offer a wide range of possibilities for exploring physiological phenomena. The facilities with which chemicals can modify plant growth and development indicate a relatively easy entry of applied chemicals into the cells of organism. It is now a recognized fact that most, if not all, physiological activities of the plant are regulated by a variety of chemicals such as auxins, gibberellins, kinins and inhibitors including phenols. These growth promotors and inhibitors have been shown to influence dormancy, germination, morphogenesis, growth, flowering, fruit set and yield[1-14]. This study reports the synthesis and characterization of various xanthates and their effect on germination and early seedling growth in wheat (*Triticum aestivum* L.).

Xanthates were prepared by dissolving potassium hydroxide in distilled water, adding benzene followed by respective alcohol (*n*-propanol, *iso*-propanol, *n*-butanol, *iso*-butanol with constant stirring and finally adding carbon disulphide very slowly and maintaining the temp. 4-5 ºC (benzene is toxic so, appropriate precaution is necessary). The molar ratio of KOH, alcohal and CS_2 was 1:1:1. The solid product was filtered and washed with ether dried under vaccum and used for germination studies. The physico-chemical properties of purified various xanthates are shown in Table-1.

TABLE-1
SOME PHYSICOCHEMICAL PROPERTIES OF SYNTHESIZED VARIOUS XANTHATE

Compound	Colour and m.p.	C=S (cm^{-1})	C-O-C (cm^{-1})
Potassium *n*-propyl xanthate ($C_4H_7OKS_2$)	White (230 ºC)	1070	1100-1151
Potassium *iso*-propyl xanthate ($C_4H_7OKS_2$)	White (274 ºC)	1075	1120-1165
Potassium *n*-butyl xanthate ($C_5H_9OKS_2$)	Light yellow (254 ºC)	1110	1150-1180
Potassium *iso*-butyl xanthate ($C_5H_9OKS_2$)	Light yellow (262ºC)	1015	1130-1125

The seeds of wheat Pusa Ruby Lot No.- 7-10Cy (d)-19 were obtained from the National seed Corporation Ltd., New Delhi and germination studies were conducted at room temperature (28 ± 2 ºC). The seeds were surface sterilized with 0.1 % mercuric chloride solution for 2 min, washed three times with water and germinated in petri dishes (11 cm) lined with filter paper and moistened with different test solution of 5, 10, 25 and 100 ppm potassium *n*-propyl xanthate, potassium *iso*-propyl xanthates, potassium *n*-butyl xanthate, potassium *iso*-butyl xanthates. Distilled water was used as control solution. Three replicate (each consisting of 20 seedlings) of each chemical treatment were maintained. Percent germination, length and dry weight of shoot and root were recorded 8 days after soaking in test solutions. For each observation, sample in triplicate (each consisting of 10 seedlings) were taken

TABLE-2
GERMINATION AND SEEDLING GROWTH IN WHEAT IN VARIOUS XANTHATE VALUES ARE THE AVERAGE OF 30 SEEDLINGS

Chemical sance	Conc. (ppm)	Germination (%)	Shoot length (cm)	Shoot dry weight seedings (g)	Root length (cm)	Root dry weight (g)
Potassium *n*-propyl xanthate	5	94.80	4.27	0.130	5.66	0.116
	10	91.50	5.55	0.131	5.09	0.112
	25	91.00	5.00	0.110	4.92	0.104
	50	90.80	4.23	0.113	4.73	0.094
	100	90.00	4.19	0.101	4.69	0.082
Potassium *iso*-propyl xanthate	5	94.50	4.15	1.000	4.84	0.130
	10	91.50	4.45	0.133	4.95	0.128
	25	91.00	4.40	0.127	5.00	0.129
	50	81.80	3.08	0.127	5.12	0.130
	100	68.20	3.00	0.121	4.40	0.011
Potassium *n*-butyl xanthate	5	95.50	5.20	1.000	4.20	0.040
	10	91.50	5.00	0.143	4.50	1.144
	25	91.00	4.81	0.152	4.80	0.146
	50	90.00	4.08	0.135	4.60	0.140
	100	89.50	4.00	0.121	4.50	0.112
Potassium *iso*-butyl xanthate	5	94.00	5.10	1.000	1.08	0.100
	10	92.00	4.55	0.121	4.95	0.118
	25	89.10	4.56	0.123	4.96	0.120
	50	50.50	4.20	0.111	4.98	0.125
	100	47.10	4.20	0.103	4.71	0.118

randomly. The data were subjected to statistical analysis based on analysis of variance according to Brunning and Kintz[2].

Percent germination decreased as the concentration of chemical increased (Table-2). The behaviour of potassium *n*-propyl xanthate, potassium *n*-butyl xanthate and potassium *iso*-propyl xanthate were almost similar while potassium *ios*-butyl xanthate significantly decrease germination about by 50 % at 50 and 100 ppm. This indicate that *iso*-butyl group significantly decreases percent germination as compared with other xanthate. Chemical treatments have differentially affected seedling growth at different concentrations. Length and dry weight of shoots had been increased at 5 and 10 ppm potassium *iso*-propyl xanthate and either decreased or were not affected significantly by other chemical treatments (Table-2). Root length increased at 5, 10 and 25 ppm potassium *iso*-propyl xanthates and potassium *n*-butyl xanthates, These findings indicate that a *n*-butyl group when attached with xanthate favours cell division and enlargement at shoot and root apices which ultimately increased dry matter production. *Iso*-propyl xanthate favours cell division and enhancement only at root apices at 5, 10 and 25 ppm, resulting in increased root length but not in increased root dry weight, thus indicating a differential effect on length and dry weight of root. Probably *n*-butyl xanthate group regulates the endogenous level of growth promoters such as auxin and gibberellins at lower concentrations and ultimately induce cell division and enlargement. The other group such as *n*-propyl xanthate, *iso*-butyl xanthate decreased length and dry weight of shoots and roots probably because of inhibition in mitotic activity by increasing endogenous levels of growth inhibitors in developing seedlings. This view, however, need further experimental proofs on the activity of growth promoters and inhibitors in developing seedling of wheat (*Triticum aestivum* L.).

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