

# Studies As Plant Growth Regulators of Carvacryl Ethers

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**ABSTRACT:** A number of carvacryl ethers have been synthesized from carvacrol under MW irradiation technique and that tested against an activity of Wheat seed as plant growth regulators.

**KEY WORDS:** Carvacrol, Ether, Alkylolation, Plant Growth Regulator, Monoterpenoids

## I. INTRODUCTION

Plant growth regulators are organic compounds other than nutrients that in small amounts promote, inhibit, or otherwise modify a physiological process in plants. Parallel to the natural phytohormones, numerous synthetic compounds such as carboxylic acids, esters and sesquiterpenes lactones have shown plant growth regulating activity<sup>1</sup>. Some sesquiterpenes lactones present in certain plants have been reported to be responsible for the allelopathic properties by affecting the germination and growth of other species<sup>2,3</sup>. The potential allelopathic activity of several natural and synthetic sesquiterpenes lactones has been investigated and the presence of  $\alpha$ -methylene  $\beta$ -butyrolactones has been shown to be important for biological activity. Besides presence of other reactive centre such as  $\alpha, \beta$ -unsaturated ketones, chlorohydrin, epoxide, hemiacetal and also the molecular arrangement is normally important for biological activity presented by these lactones<sup>4</sup>. Based on the observations that ether shows plant growth regulatory activity, a number of ether derivatives of carvacrol were prepared and screened for plant growth regulatory activity.

Carvacrol is antiseptic, carminative, disinfectant and eschorotic combined; it forms an efficient gas in inflammatory conditions. It is not employed internally. In dental practice, carvacrol has been used as a substitute for the creosote, carbolic acid and glycerol of thymol in the treatment of odontalgia, sensitive denture, alveolar abscess and as an antiseptic in the pulp canals of teeth<sup>5,6</sup>.

## II. RELATED WORK

Structural modifications of phenolic monoterpenoid obtained by reacting carvacrol with various substituted  $\alpha$ -chloro acetanilides, to improve biological activities, give the product with better yield and higher purity under mild reaction conditions with the help of microwave irradiation technique<sup>7</sup>. [Reaction Scheme]



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**Table 1: Growth regulating activity of *N*-chloro acetanilides, ether derivatives of carvacrol**

Compounds	Germination (%) Concentration		Seedling growth			
			Mean Root length(cm) Concentration		Mean shoot length(cm) Concentration	
	1%	2%	1%	2%	1%	2%
Aniline	06.66	----	----	----	----	----
Carvacrol	----	----	----	----	----	----
3a	----	----	----	----	----	----
3b	16.66	23.33	0.34	1.30	0.26	0.35
3c	----	----	----	----	----	----
3d	03.33	----	0.20	----	0.4	----
3e	20.00	40.00	3.72	1.35	1.48	0.63
3f	26.66	33.33	1.10	2.35	0.78	2.48
5a	80.00	----	1.04	----	1.13	----
5b	100.00	----	3.45	----	1.33	----
5c	80.00	03.33	0.50	0.30	0.16	
5d	0.00	----	----	----	----	----
5e	0.00	----	----	----	----	----
5f	100	----	0.89	----	----	----
Control	93.33	63.33	2.14	0.40	0.63	----

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**Table 2: Vigour index and phytotoxicity**

Compounds	Vigour Index Concentration		Phytotoxicity	
			Concentration	
	1%	2%	1%	2%
Aniline	3.66	----	93.24	100.00
Carvacrol	----	----	----	----
3a	----	----	100.00	100.00
3b	9.99	38.49	90.81	64.86
3c	----	----	100.00	100.00
3d	1.99	----	94.59	100.00
3e	104.4	79.21	----	----
3f	50.12	160.98	70.27	36.49
5a	173.60	----	0.216	----
5b	478.0	----	-0.72	----
5c	52.8	0.99	0.76	0.36
5d	----	----	----	----
5e	----	----	----	----
5f	108.0	----	0.610	----
Control	258.5	29.76	----	----

## IV. RESULTS AND DISCUSSION

Phytotoxicity inhibition in germination of *Triticum astivum* was observed at all the test concentrations. The minimum germination of *Triticum astivum* at a concentration of 1% was recorded with **5d** and **5e** as compared to control (acetone 93.33%). The maximum germination of 100 % at 1 % concentration was observed with **5b** i.e. ether derivatives of carvacrol (see **Table 1**), while compounds carvacrol, **3a**, **3c**, **5d** and **5e** do not show germination at 1% concentration. The minimum germination of *Triticum astivum* at a concentration of 2% was recorded with **5c** as compared to control (acetone 63.33%), whereas maximum germination of 23.33% at 2% concentration was observed with **3b**. The compounds aniline, carvacrol, **3a**, **3c**, **3d**, **5a**, **5b**, **5d**, **5e** and **5f** compounds do not show germination at 2% concentration.

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The compound **3d** shows significant decrease (0.20) in growth regulating activity at 1% concentration and compound **5c** shows significant decrease (0.30) in growth regulating activity at 2% concentration.

A decrease in shoot length of the treated seedlings than control was observed with all the tested compounds (**Table 1**). However no fixed pattern was found and also in case of compounds **5a-f** irregularity of germination occurs.

The calculated vigour index (**Table 2**) shows that there was inhibition of growth of wheat seedling at 1% and 2% concentration. The minimum inhibition of seedling vigour was recorded with compound **3d** (1.99) at concentration 1% and **5c** (0.99) at 2 % concentration. The maximum inhibition of seedling vigour is shown by compound **7b** (478.0) at concentration 1% and also by compound **3f** (160.98) at 2% concentration.

The highest phytotoxicity was found to be 100 % in case of compounds **3a** and **3c**, while minimum phyto toxicity was found in **5b** at 1% concentration. The compounds aniline, **3a**, **3c** and **3d** shows the highest phyto toxicity (100%) while minimum phytotoxicity was found to be in **5c** at 2 % concentration. The compounds carvacrol, **3e**, **5d**, **5e** and **5f** do not show phyto toxicity at 1 % concentration. While the compounds carvacrol, **3e** and all the compounds of the series **5a-f** except a **5c** does not shows phyto toxicity at 2 % concentration.

Thus, it can be concluded that all the compounds have an adverse effect on germination and seedling growth of *Triticum astivum* (Trade name Lok-one) but irrespective of concentration of compounds used.

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