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Herbicidal Activity of 4-Arylidene-2-Phenyl-2-Imidazolin-5-One

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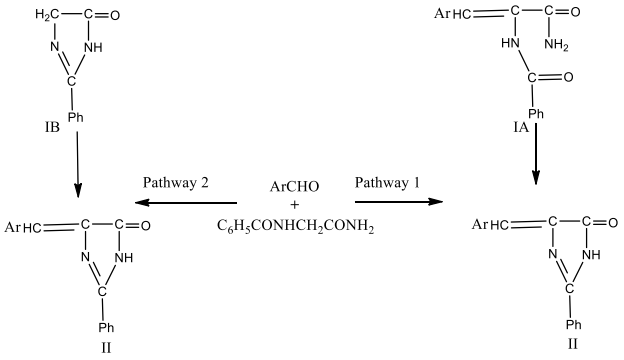
***Abstract*: Condensation of aromatic aldehydes with benzoyl glycine amide in saturated potassium carbonate solution yield imidazolinones Eight imidazolinones have been synthesised. The herbicidal activity of the synthesised compounds have been evaluated against Echinochola crus-galli(barnyard grass weed) and protulaca oleracea, most harmful weed in paddy field.**

***Keywords*: Herbicidal activity**

1. Introduction

The 4-Arylidene-2-imidazolin-5-ones are an important class of compounds as they can be converted into amino acids and their derivatives by reduction and hydrolysis. In this work 4-arylidene-2-phenyl-2-imidazolin-5-one was synthesized by boiling benzoyl glycine amide and an aromatic aldehyde for 3hrs in saturated aqueous solution of potassium carbonate (scheme I) and their herbicidal activity has been evaluated.



Scheme I

Table 1
Synthesised 4-arylidene-2 –phenyl-2-imidazolin-5-ones

Compd No	Ar	m.p.
1	Phenyl	282
2	4-Chlorophenyl	310
3	4-Methoxy phenyl	300
4	2- Chlorophenyl	267
5	3,4-Dimethoxy phenyl	269
6	3,4-Methylenedioxy phenyl	295
7	3-Nitro phenyl	261
8	4- Nitro phenyl	313

Herbicidal activity: The herbicidal activity of 8 compounds and bispyribac herbicide as standard was evaluated against Echinochola crus-galli (barnyard grass weed) and protulaca oleraceae. All compounds were dissolved in DMSO (Dimethylsulfoxide). The tested concentrations from each compound and standard herbicide were 0.01,0.05,0.1and 0.5ppm. On the other hand, the effect of DMSO and distilled water against two weeds also carried out phtotoxicity test. The tested compounds and a reference herbicide, bispyribac, were dissolved in DMSO followed by dilution with distilled water to obtain stock solution of 2.7 ppm. Then a series of concentrations (0.01,0.05,0.1 and 0.5ppm) was prepared by dilution with distilled water. An aqueous solution of DMSO was used as control treatment. Three replicates, each of 0.2gms of purslane and barnyard grass were prepared for each treatment using glass Petri-dish (9cm) lined with Whatman No.2 filter paper. 6mL of each solution were added to each Petri-dish. Then the Petri-dish were placed in the bottom of 0.1mm thick polyethylene bags (15×30cm) that were expanded to contain air and closed at the top with rubber bands to prevent loss of moisture. The Petri-dish were kept on a germination cabinet at 20oC. After 10 days of sowing root and shoot lengths were determined. The growth inhibition percentage of root and shoot length were calculated from the following equation %I= (1-T/C) ×100; T is the length of treatment (cm) and C is the length of the control (cm).

Table 2
Herbicidal Activity of 4-Arylidene-2-phenyl-2-imidazolin-5-one

Compound	Echinochloa crus-galli		Portulaca oleraceae	
	Shoot	Root	shoot	Root
1	-	-	+	+
2	-	-	+	+
3	-	-	+	+
4	+	+	+	+
5	-	-	+	+
6	-	-	+	+
7	+	+	+	+
8	+	+	+	+
Water control	-	-	-	-
DMSO control	-	-	-	-
Bispyribac	+	+	+	+

+ = active, - = not active

Table 3
Effect of Compound 4, 7& 8 and bispyribac in barnyard grass root after 10 days of sowing

Conc.	Compound 4		Compound 7		Compound 8		Bispyribac	
	Root length(cm)	I(%)	Root length(cm)	I(%)	Root length(cm)	I(%)	Root length(cm)	I(%)
0	3.5	0	3.5	0	3.5	0	3.5	0
0.01	3.42	2.3	3.46	1.2	3.44	1.7	3.45	1.4
0.05	2.3	34.3	2.6	25.7	2.35	32.8	2.59	26
0.1	1.62	53.7	1.80	48.5	1.92	45.1	1.86	46.8
0.5	1.0	71.4	1.0	71.4	1.2	65.7	1.1	68.6

The result showed that better herbicidal activity of synthesized compounds than the standard herbicide against Echinochola crus-galli (barnyard grass weed).

2. Conclusion

This study aimed to developing new pesticides. Compounds 4, 7 & 8 showed excellent herbicidal activity against grass weeds; especially against Echinochola crus-galli, one of the most harmful weed in paddy fields.

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