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Original Research Paper

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STUDY OF ANTIMICROBIAL ACTIVITY OF MIXED LIGAND NI(II) COMPLEX AND IT'S EFFECT ON GERMINATION OF SOME SELECTED SEEDS

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ABSTRACT In the present study mixed ligand complex of Ni(II) with urea and metronidazole was synthesized and characterized by elemental analysis, i.r. and n.m.r. spectral data. Study of Antibacterial activity of this complex is done on E.coli. ,K. pneumonia ,Rizobium, S.aureus and seeds selected were brassica nigra and T. auestivum. It was found that antibacterial activity of this synthesized complex was lesser than metronidazole but more than urea .Complex showed positive effect on germination of T. auestivum seed at low concentration but at high concentration the result was negative. In case of brassica nigra seeds. It did not show positive effect at any concentration range.

KEYWORDS : Mixed ligand Complex, Antibacterial activity, Metronidazole

INTRODUCTION

Nickel occurs in small amount in soil and it is a micro nutrient for plant growth and development. At very low concentration it express some effect on germination of seeds. Deficiency of nickel causes toxic effect in plant due to high concentration of urea. Nickel is main component of urease . Urease regulates metabolism of nitrogen containing compounds and this process play essential role during seed germination .Metronidazole is a heterocyclic drug and used mainly as antibacterial and antifungal agent, possess ability to form complex with metals .Many metronidazole complexes of cu,Zn,Pt,Ni Cd,Co,Fe are known having antimicrobial activity ,anti fungal activity and antiviral activity. Urea is nitrogen containing fertilizes and provide nitrogen to plants. Having adverse effect of high urea concentration on germination of seed ,in present study complex of urea and metronidazole with nickel is examined for germination of T.auestivum and brassica nigra seeds .It was assumed that in complex form urea is not freely available in effective amount to affect the germination of seed. In seed germination seed absorbs water by micropyle and seed swells ,the swelling of embryonic tissue ruptures the seed coat and allow to grow plumule and radical to emerge. The main function of water to activate enzymes which is necessary for hydrolysis of stored food materials .Except water the other requirements are temperature ,light, presence of oxygen . The growth and development of plant are acquired by active cell division and differentiation in certain localized region of plant. The urea and its derivatives have also ability to co ordinate with metal ion many complexes of derivative of urea with many metals are known having antibacterial activity. nickel chloride also have some anti bacterial activity.

EXPERIMENTAL

Material and Methods- synthesis of complex- All the chemicals were analytical grade purchased from Merck and S. d . fine and used as supplied. In 250 ml r.b. flask 20 ml of .02 M ethanolic solution of nickel chloride is prepared and it mixed with equimolar solutions of urea and metronidazole in ethanol (20mlof each). Refluxed the content for 3 hours and then cooled ,filtered, washed and dried . Recrystallized it by methanol.

(II) Antibacterial Studies-Antibcterial study were done by disc diffusion method on selected bacterial strains E.coli. ,K. pneumonia ,Rizobium, S.aureus.

(III) Study of seed germination- Brassica nigra and T. auestivum seeds were selected for petri dish method firstly seeds were sterilized in mercuric chloride and ethanol. The 25,50,75,100,125 μM solution of metronidazole , urea and complex were prepaered.100 healthy seeds of each species of same size were soaked in each solutions of different concentration for three hours using Distilled water as control. The seeds then transferred into petri dishes with cotton beeds containing specific solutions. Dishes were incubated at240C for 24 hours in dark and then transferred in light conditions for two days and again in dark for two days .then percentage germination was calculated.

%Germination = No. of seeds germinated /total no. of seeds $\times$100

Percentage of elements	%C	%N	%H	%O	%Cl	%Ni
s	20.30 (20.31)	16.91 (16.91)	4.35 (4.36)	27.06 (27.05)	17.15 (17.16)	14.01 (14.03)

RESULT AND DISCSSION

Characterization of complex- Colour- Dirty green
Molar Conductance – 21.74 Ohm-1Cm2
Melting point- 202-205 oC
Magnetic moment- 2.32 B.M.
Molecular formula-C7N5H18O7Cl2Ni

THERMAL ANALYSIS- The complex starts decomposing at 80oC corresponds to three moles of hydrated water and after 206oC anhydrous complex decomposed.

I.R. SPECTRAL DATA OF COMPLEX-

Frequency region	metronidazole	Urea	[Ni(met)2(urea)2]Cl2.3H20
Hydrogen region	3780.3s 37.07 b	3436s 3337b	3784 s 3700b 3430 b
Double bond region	1615b 1570s	1710 s 1680 b	1660s ,b 1680s 1625 s
Single bond region	1300 s 1238w 1129 1074	1464 1150s	1500w 1459s 1370s
	998	789 717b	1083s 1140s 927b
			740 696m

H1N.M.R. Spectral Data of Complex

Chemical shift in ppm(TMS)	7.72(1H,s)	5.03(1H,s)	5.6(2H,s)	5.5(2H,s)	4.4(2H,t)	3.9(2H,t)	2.0(3H,s)

ANTIBACTERIAL ACTIVITY-

Bacterial strain	Zone of inhibition(in mm)		
E.coli K. pneumonia Rizobium S.aureus	[Ni(met)2(urea)2]Cl2	Urea	Metronidazole
	11 14 18 21 7 12 17 23 6 9 15 19 11 14 16 22	0 4 7 11 5 8 10 12 3 5 9 10 2 6 8 13	18 22 24 27 15 18 23 26 17 22 25 27 20 23 25 28
Concentration inmicro litre	20 40 80 100	20 40 80 100	20 40 80 100

EFFECT ON SEEDS GERMINATION-

T. auestivum % germination	Concentration (Urea)in μM 50 75 100 150	Concentration(nickel ion) μM 50 75 100 150	Concentration (Complex) μM 50 75 100 150
% germination	17 21 19 14	11 13 10 o8	14 17 12 10
brassica nigra % germination	08 11 06 03	10 07 06 05	06 09 07 05

on the basis of elemental analysis Proposed molecular formulaof dirty dreen complex is C7N5H18O7Cl2Ni.from theT.G.A i.r. spectral data bands appeared at 3400 -3784 cm-1 is due to C-H,N-H,O-H str.(hydrogen region).the bands appeared in double bon region are due to C=C,N=O,C=O str.And in region below 1500 cm-1 single bond str.appeared with bending vibration mood .the bands at 740 Cm-1,696Cm-l is visible in complex are due to coordinate bond.H1N.M.R.Spectra of complex gave peak 7.72 s for 1H of O-H group peak at 5.5 for N-H group and at 2.0 3H s is of CH3 proton .

Antibacterial activity istested on E.coli ,K. pneumonia ,Rizobium ,S.aureus and from table
It is clear that complex have less antibacterialactivity than metronidazole for every species.

Complex was effective forgermination ofT . auestivum seeds but will not give any positive effect on seeds of brassica nigra.

CONCLUSION

From the above discussin complex[Ni(met)2(urea)2]Cl2.3H20 showed lesser antibacterial than metronidazole , but higher than urea. On T . auestivum seed it expressed positive effect while on brassica nigra seeds it did not give positive effect.

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