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Synthesis, Characterisation and Screening of Substituted 2-Biphenyl Carboxyl amides against Fusarium udum and Curvalaria lunata

Anju Khullar
Department of Chemistry, GSSDGS Khalsa College, Patiala.

Abstract:-*Biphenyl derivatives constitute the class of Polynuclear Aromatic hydrocarbons (PAHs) containing more than one aromatic ring & have been found to be most effective against the many therapeutic diseases. Therefore, a new series of substituted 2- Biphenyl –Amides have been synthesised by the condensation of 2-Biphenyl Carboxylic acid with different primary aromatic as well as aliphatic amines.2- Biphenyl Carboxylic acid was first treated with Thionyl Chloride in dry Benzene to prepare substituted -2-Biphenyl Carboxyl Chloride, which was then treated with different aliphatic as well as aromatic amines to synthesize various substituted-2- Biphenyl Carboxyl amide derivatives. All these compounds are characterized by the analytical spectroscopic techniques to evaluate the structure elucidation. The synthesised Biphenyl compounds were screened for antimicrobial and antifungal activity via disc diffusion method against Fusarium udum and Curvalaria lunata fungi, Inspite of antifungal and antimicrobial activity these derivatives are also rich in curative activities such as anti pyretics, analgesics& anti-inflammatory, anti cancer, antibacterial, anti psychotic and anxiolytic activities. However, in this article we have screened anti fungal properties for our synthesized compounds and exhibits good activity when they tested against Fusarium udum and Curvalaria lunata.*

Keywords:- *Polynuclear Aromatic Hydrocarbons(PAHs), Polychlorinated Biphenyls(PCBs), 2- Biphenyl Carboxylic acid (2-BPCA),substituted-2-Biphenyl Carboxyl amides, Spectral studies and Anti fungal properties.*

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INTRODUCTION

The Biphenyl with independent benzene rings have been categorized in the class of Polyphenyl Compounds or isolated Polynuclear hydrocarbons. These are the poly nuclear aromatic hydrocarbons (PAHs) having more than one aromatic nucleus. Biphenyl Carboxylic acid itself & its derivatives have been found to be effective against many therapeutic diseases; one of the therapeutic diseases has been screened against Fusarium udum and Curvalaria lunata .Fusarium udum is the causal agent of wilt disease of pigeon pea which survives in off season on plant trashes in the soil. This has the ability to produce a number of biological active substances that cause diseases to the plants. The most common among the biologically active substances are enzymes involved in breakdown of cell wall of plants so that they can enter in the plant tissue. The pathogen produce fusaric acid toxin having phototoxic properties. Its polysaccharides causes blockage in xylem tissue results in storage of water and mineral solvents in translocation process of plants. Curvalaria is a hyphomycete (mold) fungus which is a facultative pathogen, or beneficial partner of many plant species and common in soil. Most Curvalaria are found in tropical regions, though a few are found in temperate zones.Curvularia lunata appears as shiny velvety-black, fluffy growth on the colony surface.

Therefore, there's need to discover novel anti fungal agents targeting Fusarium udum and Curvalaria lunata infections. Biphenyl derivatives have considerable attention due to their wide range of anti fungal activities. Biphenyl Carboxyl amides analogs have been reported as important pharmacological molecules having significant anti fungal properties against Fusarium udum and Curvalaria lunata.

The present research deals with the investigation of six synthesized biphenyl Carboxyl amides on fungal species Fusarium udum and Curvalaria lunata. All the six compounds of 2- Biphenyl Carboxyl amide derivatives namely:-N-Phenyl-2-Biphenyl Carboxyl amide (A_1),N-P-bromophenyl-2-Biphenyl carboxyl amide (A_2),N-P- Benzoic acid-2-Biphenyl carboxyl amide (A_3),N-P-chlorophenyl-2-Biphenyl carboxyl amide (A_4),N-P-Nitrophenyl-2-Biphenyl Carboxyl amide (A_5),N-hydroxy-2-Biphenyl Carboxyl amide (A_6) have shown anti fungal properties against Fusarium udum and Curvalaria lunata. Literature findings have been shown its various therapeutic uses such as anti- inflammatory[1], analgesics[2], anti pyretics[3], antiarthritis[4], antirhematoid[5], anti hypertensive[2] and a binder to human plasma-prealbumen etc.4-Biphenyl acetic acid itself has been reported to possess many effective pharmacological activities, such as analgesics, antipyretics, anti

inflammatory, anti bacterial and topical non steroidal anti inflammatory activity[6,7].The ointment containing 4-Biphenyl acetic acid work very effectively as anti inflammatory as well as analgesic agents[8]. Even the cyclodextrin inclusion complexes of 4-Biphenyl acetic acid are reported to show effective mono nuclearogenic anti inflammatory properties and its phenyl alkanamide derivatives have shown agro horticultural bactericidal activity[9].Substituted biphenyls can also used as anti-allergic drug[10] and anti inflammatory drugs[7]. Substituted biphenyl-4-acetamides have therapeutic use in the treatment of cancer[11]. The title compound of Biphenyl is also used as an anti tumor agent[12].Biphenyl-3-acetamide, 2-amino-thiazole shows anti-tumor activity also used in the treatment of cancer, Alzheimer disease, viral infection, auto-immune disease or neurodegenerative disorder[13]. 2-Biphenyl-acetic acid and 2- Biphenyl-acetamides have use as agrochemical antifungal agent [14-18]. Biphenyl containing compounds possesses anti-psychotic and anxiolytic activity[19]. Some of the Biphenyl hydrazide-hydrazone is known to exhibit very good anti microbial activity [20, 21]. Some of the compounds having Biphenyl moiety possess valuable medicinal properties like anti-hypertensive and calcium channel blockers [22-23]. Tetrazole are very well known to possess antimicrobial properties[24]. PCBs are proved to cause reproductive, endocrine and neurological disorders, thyroid disfunction, cognitive and motor deficits. Prenatal exposures are known to cause increased susceptibility to infectious diseases in childhood[25]. PCBs influenced plants diffuse oxygen in soil promoting the growth of Aerobics microbes. Soil aeration is also improved by formation of air channels when roots die, decay and by direct root oxygen release[26]. Substituted 2-BPAA useful as protease inhibitors for treating diseases including osteoporosis, gingival disease including gingivitis and periodontitis, arthritis, more specifically, Osteoarthritis and rheumatoid arthritis, Paget's disease, hypercalcernia of malignancy and metabolic bone disease, comprising inhibiting said bone loss or excessive cartilage or matrix degradation by administrating to a patient in need thereof a compound of the present invention [27].Substituted Biphenyl-4-acetamide have therapeutic use in the treatment of cancer [28]. 2-BPAA and B.P-2-Acetamide used as agrochernical antifungal agents [29]. N- isoxazole biphenyl solfonamides and related compounds used as dual angiotensin and endothelin receptor antagonists [30]. We also collected and analyzed the data on the activity of the synthesized biphenyl compounds with respect to a number of biological targets important for the therapy of diabetes mellitus and its vascular complications [31-34].Quantum chemical methods, semi-empirical calculations and other related computational techniques have previously been applied to polychlorinated dibenzodioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), and polychlorinated biphenyls (PCBs) [35–39].

The substituted biphenyls in turn can be used as an intermediate in the synthesis of pharmacologically active molecules. Compounds containing biphenyl moiety possess a wide range of activity such as antihypertensive, antimicrobial, diuretic & diabetic, antipsychotic and anxiolytic etc. Thus, there is a wide scope for the synthetic scientists and chemists to synthesize more and more compounds with different substitutions using substituted biphenyl along with an adequate heterocycles as a basic moiety. The investigation on this ring can still be continued and a number of such therapeutic importances of the biphenyl moiety can be explored.

Experimental (Method and material)

Preparation of N-Phenyl-2-BiphenylCarboxyl amides from 2-Biphenyl carboxylic- acid.

It has two steps: - First step is common for all.

Ist Step: - Preparation of 2-Biphenyl carboxyl chloride (I_A) from 2-BPCA.

Chemical Reaction: -

MF: - $C_{13}H_{10}O_2$	**Thionyl chloride**	**MF: -** $C_{13}H_9OCl$
MW: - 198.22	**M.W**.: - 119	**MW: -** 216.50
MP: - 160-163^{o}c	**B.P. -** 78-80^{0}C	**Code: -** I_A

Procedure: - Take 2-BPCA (1gm) in dry benzene (25 ml) (benzene distilled over anhydrous $CaCl_2$) and add Thionyl chloride (10 ml) in a 250ml. of R.B. flask & refluxed the reaction mixture for $2^{1/2}$ hours. After one hour the colour of the reaction mixture changes from yellow to brown. After $2^{1/2}$ hours Thionyl chloride will have been recovered along with benzene. Traces of Thionyl chloride can remove

with the help of vacuum pump. 2-Biphenyl carboxyl chloride obtained in oily form and can be used without further purification in next step to form different types of amides of 2-BPCA.
Yield: -1.042 gm (If yield is 100%)
Code: - {I_A} (As a viscous oil).
This step is similar in every experiment of this series.

General Reaction :- (Carboxyl-chloride to Carboxyl amides)

Procedure: - Dissolved aliphatic or aromatic Amines in pyridine (20 ml.)/4N-NaOH in a R.B. flask Take (I_A) (1.082gm/542 mg) and dissolved it in Dry benzene (10 ml), then pour it in R.B. flask under stirring slowly at room temperature. Stirring this solution continue for approximate 20 hours.
Let allow to workup the reaction mixture with benzene (100 ml) after 20 hours, so we have to take the reaction mixture in a separatory funnel and extract it with benzene gently. Then washout the benzene layer with water for neutralization of the nature of reaction mixture. Pyridine dissolved in water and synthesised compound becomes in the benzene layer. Aqueous layer has been separated out and solvent layer (n-hexane/Chloroform/Carbon-tetrachloride/toluene/benzene/Ethyl acetate) placed on $MgSO_4$ for 5-10 minutes, filter and takes the filtrate in a R. B. flask, then concentrate this reaction mixture by recovered the solvent through distillation, Concentrate residue was then treated with n-hexane/Chloroform/Carbon tetrachloride/toluene/benzene/Ethyl acetate for complete precipitation. We find that different coloured crystalline solids have been separated out, filter this remaining solution through Whattman filter paper No.42 and wash the solid compound with hexane for 2-3 times for the removal of colour impurities, dry & weight. I have also been taken the measurement of melting point and check TLC also of the prepared compound.

Value of R- in the general reaction:-

SCHEME OF SYNTHESIS

Characterization of the synthesized compounds

1.N-Phenyl-2-Biphenyl Carboxyl amide (A_1):- Pale yellow coloured crystalline solid, yield:- 955 mg (80%).MF:-$C_{19}H_{15}NO$,MW: - 273, M.P: -145-147^{o}c (n-hexane)T.L.C.: - Rf-0.34 (25% EtoAc: hexane) IR: - > CO: - 1661.63 cm^{-1},> NH: - 3331.25 cm^{-1}.Elemental Analysis calculated (found in%):- C-83.51(83.50),H-5.49(5.50),N- 5.12(5.15),O-5.86(5.85),(H^1NMR(DMSo-d_6)δ C_2-2H-(7.52),C_3-2H-(7.51),C_4-1H-(7.40),C'$_2$-1H-(7.79),C'$_3$-2H-(7.51),C'$_4$-1H-(7.40),C_2"-2H-(7.20), C"$_3$-1H-(6.81),C"$_4$-2H-(6.63),1H-NH-(4.0).

2.P-bromophenyl-2-Biphenyl carboxyl amide(A_2):-Dirty green colour crystalline fine solid ,yield:-820 mg (84%)MF:- $C_{19}H_{14}ON.Br$, MW: - 352,M.P.: - 93-95^{o}c (n-hexane),T.L.C.: -Rf:- 0.463,(25% EtoAc: hexane),IR: - > CO: - 1679.05cm^{-1},> NH: - 3584.23 cm^{-1}. Elemental Analysis calculated (found in %):-C-64.77(64.75),H-3.97(3.95),O- 4.54(4.52),N-3..97(3.95), Br-22.97(22.95), H^1NMR(DMSo-d_6) δC_2-2H-(7.52),C_3-2H-(7.50),C_4-1H-(7.41),C'$_2$-1H-(7.79),C'$_3$-2H-(7.50),C'$_4$-1H-(7.41),C_2"-2H-(6.52), C"$_3$-2H-(7.35),1H-NH-(4.0).

3.N-P- Benzoic acid-2-Biphenyl carboxyl amide (A_3):- Dirty green colour crystalline fine solid ,yield:-1.20 gm. (90%),MF:- $C_{20}H_{15}NO_3$,MW: -317,MP: -203-205^{o}c (hexane),T.L.C.: - Rf:- 0.331 (20% MeOH: $CHCl_3$)IR: - >CO: - 1678.98 cm^{-1},> NH: - 3322.03cm^{-1}. Elemental Analysis calculated (found in %):-C-75.70(75.75),H-4.73(4.75),N- 4.41(4.52),O-15.14(15.15), H^1NMR(DMSo-d_6) δ C_2-2H-(7.52),C_3-2H-(7.51),C_4-1H-(7.41),C'$_2$-1H-(7.79),C'$_3$-2H-(7.51),C'$_4$-1H-(7.41),C_2"-2H-(6.52), C"$_3$-2H-(7.81),1H-NH-(4.0),1H->COOH-(11.2).

4.N-P-chlorophenyl-2-Biphenyl carboxyl amide(A_4):- White crystalline solid, yield:-1.35 mg. (95% yield),MF:-$C_{19}H_{14}NOCI$,MW: - 307.50,M.P.: - 96-98^{o}c (hexane),T.L.C.: Rf:- 0.382, (10% EtoAc: hexane)IR: ->CO: - 1651.70 cm^{-1},> NH: -3470.24 cm^{-1}. Elemental Analysis calculated (found in %):-C-74.14(74.15),H-4.55(4.57),N- 4.55(4.56),O-5.20(5.25),Cl- 11.54(11.56), H^1NMR(DMSo-d_6) δC_2-2H-(7.52),C_3-2H-(7.51),C_4-1H-(7.41),C'$_2$-1H-(7.75),C'$_3$-2H-(7.51),C'$_4$-1H-(7.41),C_2"-2H-(6.57), C"$_3$-2H-(7.24),1H-NH-(4.0).

5.N-P-Nitrophenyl-2-Biphenyl Carboxyl amide (A_5):- Mustard coloured crystalline solid, yield:-1.455 gm (95% yields) MF:-$C_{19}H_{14}N_2O_3$,MW: - 318MP: -130 -132^{o}c (EtoAc, n-Hexane),T.L.C.: -Rf:- 0.459 (50% $CHCI_3$:Benzene),IR: -> CO: - 1633.03 cm^{-1},> NH: - 3346.12 cm^{-1}, Elemental Analysis calculated (found in %):-C-71.69(71.71),H-4.40(4.42),N- 8.81(8.84),O-15.10(15.12), H^1NMR(DMSo-d_6)δC_2-2H-(7.52),C_3-2H-(7.51),C_4-1H-(7.41),C'$_2$-1H-(7.79),C'$_3$-2H-(7.50),C'$_4$-1H-(7.40),C_2"-2H-(6.89),C"$_3$-2H-(8.01),1H-NH-(4.0).

6.N-hydroxy-2-Biphenyl Carboxyl amide (A_6):- Mustard yellow crystalline solid, yield:-350 mg (75%) MF:- $C_{13}H_{11}O_2N.CI$, MW: - 248.50,M.P.:138-140^{o}c (hexane),T.L.C.: -Rf: - 0.648 (70% EtoAc: hexane),IR: -> CO: - 1610.36 cm^{-1},> NH: - 3335.51 cm^{-1}, CO: - 1633.03 cm^{-1},> NH: - 3346.12 cm^{-1}, Elemental Analysis calculated (found in %):-C-62.77(62.79),H-4.42(4.40),O- 12.8(12.9),N-5.6(5.8),Cl-

14.28(14.30), H^1NMR(DMSo-d_6) δ C_2-2H-(7.52),C_3-2H-(7.51),C_4-1H-(7.40),C'_2-1H-(8.50),C'_3-2H-(7.72),C'_4-1H-(7.50),1H-NH-(6.0),1H-(HCl).

7.Preparation of N-amido-2-Biphenyl carboxyl amide (A_7):- Light brown crystalline solid, yield:-490 mg. (92%),MF:- $C_{14}H_{12}N_2O_2$, MW: - 240,M.P.: -192 – 193^o (hexane),T.L.C.: -Rf:- 0.374 (5% MeOH: $CHCI_3$),IR: -> CO: - 1690.54 cm^{-1},> NH: - 3377.61 cm^{-1}, Elemental Analysis calculated (found in %):- C-70(70.01),H-5.0(5.02),N- 11.66(11.69),O-13.33(13.32),H^1NMR(DMSo-d_6) δ C_2-2H-(7.52),C_3-2H-(7.51),C_4-1H-(7.40),C'_2-1H-(8.52),C'_3-2H-(8.09),C'_4-1H-(7.41),1H-NH-(4.0),2H-NH_2-(6.0).

8. N-Thioamido-2- biphenyl-Carboxyl amide(A_8):- Cream coloured crystalline solid ,yield:-390 mg (85%),MF:- $C_{14}H_{12}N_2OS$,MW:-256,MP:-132-133^{o}c (hexane),T.L.C.: - Rf :– 0.35 (.20% EtoAc: Hexane),I.R: - > CO: -1633.66 cm^{-1},> NH: - 3305.39 cm^{-1}, Elemental Analysis calculated (found in %):- C-65.62(65.65),H-4.68(4.72),N- 10.93(11.96),O- 6.25(6.28), S-12.50(12.52),H^1NMR(DMSo-d_6) δ C_2-2H-(7.52),C_3-2H-(7.51),C_4-1H-(7.41),C'_2-1H-(8.52),C'_3-2H-(8.04),C'_4-1H-(7.40),1H-NH-(4.0),2H-NH_2-(8.56).

9. 2-Biphenyl Carboxyl amide(A_9):- Dirty yellow crystalline solid, Yield : - 890 mg (90 %), MF:- $C_{13}H_{11}NO$,MW: - 197,MP:-159-160^{o}c(Acetone) T.L.C.: -Rf :-0.3337 {20% EtoAc: Hexane},I.R.: - > CO: - 1630.94 Cm^{-1},> NH: - 3334.29 Cm^{-1}, Elemental Analysis calculated (found in %):- C-79.18(79.20),H-5.58(5.60), N- 7.10(7.11),O- 8.12(8.13),H^1NMR(DMSo-d_6) δ C_2-2H-(7.52),C_3-2H-(7.51),C_4-1H-(7.41),C'_2-1H-(8.52),C'_3-2H-(8.01),C'_4-1H-(7.59),1H-NH-7.5).

Identification of antifungal properties of six synthesised 2-Biphenyl Carboxyl amides:-

Introduction: - As the Literature findings have been shown that biphenyl and its derivatives shows potential biological as well as pharmacological properties. Thus, tested six synthesised Biphenyl amides on two different species of Fungus names: Fusarium–Udum and Curvalaria-Lunata successfully. During experiments six compounds show growth resistance property against these two particular fungi.

It has been observed that growth resistant power of the six synthesised compounds by making solutions of different ppm (part per million). One petric plate of the solvent (which was used for dissolving the compound) also used during the experiments along with the 250 ppm, 500 ppm and 1000 PPM solution of each compound. Three replicates were used during one experiment and four petric plates used in a set. Thus, 12 petric plates were used within one experiment. All the experiments show that the concentration of the solution of compounds increase as well as its growth resistance power is also increases thus, the growth of fungus in control plate becomes maximum, while in 1000 ppm's plate becomes minimum.

I. EXPERIMENTAL

Agar-Agar Media/Czepeck's Media: -

This media was used for the growth of fungus. Thus, first of all prepared this media according to our requirement.500 ml media was sufficient for 24 petric plates, so that 250 ml media was sufficient for 12 petric plates. The quantity of contents of this particular media is as follows: -

Czepeck's Media (fungus media)

Requirements

For 1 Litre Media

Agar – Agar: -	15.0 gm
KH_2Po_4: -	01.0 gm
$MgSo_4.2H_2O$: -	00.5 gm
KCI: -	1.0 gm
$FeSo_4$: -	Traces
Yeast Powder: -	00.5 gm
$NaNo_3$: -	02.0 gm
Dextrose: -	10.0 gm
Distilled Water: -	1 Litre

Procedure of Preparation of Czepeck's Media: -

We will dissolve all the contents of Czepeck's media in calculated amount for 500 ml distilled water. Then have to use conical flask of 500 ml capacity, which was, already 24 hours sterilized an oven at a maintained temperature (30^{o}C). After that we will take 500 ml distilled water in the sterilized conical flask, then add all the contents one by one carefully in the conical flask, in sterilized chamber. Hands were also sterilized for preserving the experiment from bacterial contamination after that conical flask in autoclave and heated it up to 15 mm pressure. Then, release the pressure up to the zero point. Now, put the conical flask on the table

for achieving the room-temperature. But, media should not be cooled down, if it becomes freezed out then it will be totally useless for us.

Procedure of Preparation of Fungus Solution: -

First of all we will take distilled water (25 ml) in a conical flask and will add some porcelain pieces in it.After that sterilized the conical flask in autoclave up to10mm pressure. Now we will notice that when the pressure of autoclave comes down up to zero point, then release the pressure of autoclave and wait for few minutes. Now finally open the autoclave and put the conical flask on the table for achieving room-temperature. Then, inject very few quantity of fungus used for the growth such as: - Fusarium Udum with the help of Inoculation needle in sterilized medium. Now we will shake the conical flask to spread out the spores of fungus in the water finely.

Procedure of Growing the Fungus: -

For the procedure of growing fungus fist of all we will take two petric plates and pour 1ml solution of fungus (used for the identification of antifungal properties of compounds) in each petric plate, add Agar- Agar Media (15ml) in each petric plate. Then for the good result we have to wait for 4-5 days for the growth of fungus in these petric plates.

After the growth of particular fungus, cut the blocks of the fungus of a particular size (3mm). These blocks were replaced in another petric plate along with Czepeck's media (15ml) and the solution of compound (1ml). Now, the identification of antifungal property of a particular compound on specific fungus might be possible.

Procedure for the Preparation of Solutions of Compounds of different ppm: -

We used absolute ethyl alcohol for dissolving all the six compounds. Thus, control plate of each experiment having only absolute ethyl alcohol in it. For the preparation of solution of different ppm's of a particular compound, weigh the compound (10ml) and dissolved in absolute- Ethyl alcoh0l (10ml) for the preparation of solution of 1000 ppm. Now, take 3ml solution of this 1000 ppm and add 1ml absolute ethyl alcohol for the preparation of solution of 750 ppm. Take 2ml solution of 1000 ppm and add 2ml absolute ethyl alcohol for the preparation of solution of 500 ppm. Take 1ml solution of 1000 ppm and add 3ml absolute alcohol for the preparation of solution of 250 ppm. Only control, 250 ppm, 500 ppm and 1000 ppm's solutions were used in all the experiments. Three replicates used within one Experiment. Thus, 12 petric plates were used in one experiment.

A) Identification of antifungal property of-2-Biphenyl Carboxyl amides derivatives on Fusarium- Udum and Curvalaria- lunata: -

1) Growth of Fungus: -

For the growth of fungus we have to prepare the fungal solution of Fusarium Udum and Curvalaria Lunata, by taking 25ml of distilled water in two conical flasks and placed some porcelain pieces in both the conical. Now we will seal the mouth of conical with cotton cork and placed it in autoclave and heated up to 10mm pressure. Now, pressure comes down up to the zero point, then release the pressure of autoclave and wait for few minutes. Now we will open the autoclave and placed the conical on table for achieving the room temperature. Now, inject few quantity or minimum amount of fungus from test tube into conical flask in sterilized media carefully and shake the conical very gently for spreading out the spores of Fungus finely and equally in water. Now we will prepare 125ml of Czepeck's media through the procedure as described before in this chapter. Pour 15ml of Czepeck's media in each petric plate and add 1ml of the solution of fungus separately in each plate very carefully with the help of graduated pipette in the sterilized medium. Now for the good result we have to wait for 4-5 days for the growth fungus, when fungus becomes grow, now cut the blocks of fungus of particular size (3mm) and used these blocks for the identification of antifungal property of each synthesised amide.

2) Identification of antifungal property: -

For the identification of antifungal property, first of all prepared 500ml of Czepeck's media and pour about 15ml of the media in each petric plate and also we have to add 1ml of solvent, 250 ppm's, 500 ppm's and 1000 ppm's solution in each petric plates respectively Thus, the set of 4 petric plates and three replicates were used, thus twelve plates were used for one experiment. Solution of different ppm of a particular compound prepared by the process as mentioned above. Now, put the block of a particular fungus at the centre of all 12 petric plates.

The same procedure was used for the identification of anti fungal properties of all six biphenyl acetamides derivatives such as: -

I) - N-Phenyl-2-Biphenyl Carboxyl amide (A_1).
II)- N-P-bromophenyl-2-Biphenyl carboxyl amide (A_2).
III)- N-P- Benzoic acid-2-Biphenyl carboxyl amide (A_3).
IV)- N-P-chlorophenyl-2-Biphenyl carboxyl amide (A_4).
V)- N-P-Nitrophenyl-2-Biphenyl Carboxyl amide (A_5).
VI)-N-hydroxy-2-Biphenyl Carboxyl amide (A_6).

Results of the identification of anti- fungal Properties of 2-Biphenyl Carboxyl amides on Fusarium Udum and Curvalaria-lunata respectively

Size of Block of fungus used: - 3 mm, Solvent used: - Absolute Ethyl alcohol:-Growth of the fungus on block concentration of solution of compounds

S. No.	Code	Time	Temperature	Control (Ethyl alcohol)	250 ppm	500 ppm	1000 ppm
1.	A_1	198 hrs.	8±2°C	11mm	8mm	7mm	5mm
2.	A_2	195 hrs.	8±2°C	8mm	6mm	5mm	4mm
3.	A_3	200 hrs.	8±2°C	11mm	9mm	6mm	5mm
4	A_4	140 hrs.	9±2°C	13mm	11mm	8mm	4mm
5	A_5	164 hrs.	9±2°C	17mm	15mm	8mm	3mm
6.	A_6	150 hrs.	9±2°C	9mm	5mm	3mm	1mm

S. No.	Code	Time	Temperature	Control (Ethyl alcohol)	250 ppm	500 ppm	1000 ppm
1.	A_1	164 hrs.	8±2°C	16mm	12mm	5mm	0mm
2.	A_2	154 hrs.	8±2°C	12mm	10mm	8mm	2mm
3.	A_3	220 hrs.	8±2°C	15mm	11mm	3mm	1mm
4.	A_4	160 hrs.	9±2°C	12mm	9mm	6mm	2mm
5.	A_5	164 hrs.	9±2°C	15mm	11mm	8mm	2mm
6.	A_6	140 hrs.	9±2°C	9mm	6mm	4mm	1mm

II. CONCLUSION

The synthesis of amides becomes complete within two steps. In first step we convert 2BPCA into 2-biphenyl carbonyl chloride (as a viscous oil) and in second step this carbonyl chloride, derivative reacts with different types of suitable amines in Pyridine/4N-NaOH at room temperature under stirring to form different types of amides. A lot of compounds have been synthesised of this particular series and obtained in remarkable yields up to 92%. Particularly aromatic amines react very conveniently, but aliphatic amines have not given better results as compared to the aromatic amines. Thus, the yield of compounds, prepared by reacting aliphatic amines with 2-biphenyl- carboxyl chloride was poor as compared to those, prepared by reacting aromatic amines with 2-Biphenyl carboxyl chloride. On the other hand urea, thiourea and glycine which are water soluble have not given positive results. Thus, only those aromatic and aliphatic amines which are water insoluble were successfully used during the synthesis of the simple amides of 2-Biphenyl-Carboxylic-Acid.

Antifungal properties of only six compounds were counted on two fungi, named: - Fusarium Udum and Curvalaria Lunata. Three different types of dilutions (250 ppm, 500 ppm and 1000 ppm) were used along with control (only solvent).Thus, one set is of the four plates and 3 replicates were used during each experiment. So twelve petric plates were arranged on a table for one experiment .Observations was taken at particulars temperature, within a particular time period on these two above mentioned fungus. Sometimes we face problems during the preparation of Czepeck's media (used as a growing media for the growth of fungus in petric plate) for the identification of antifungal properties. Sometimes bacterial contamination also appeared within petric plate during our experimental work. Thus, sometimes we repeated experiment for 3-4 time and then we observed results. But all the six compounds show positive results and resist the growth of a particular fungus. This has been

observed from experimental observations, that as the concentration of the solution of a particular compound increased, the resistant power of a particular compound was also increased to resist the growth of a particular fungus. Thus, it is clear from the photographs that the growth of fungus in control plate becomes maximum and in the plate of 1000 ppm it becomes minimum.

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