

# Review On Herbal remedies for diabetes mellitus

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**Abstract-** Diabetes mellitus is one of the oldest conditions, which has been and is a vast area under discussion, which is placing a huge burden of illness on victims and society as well. Diabetes is a well known and a veritably common complaint which has been defined in different ways. Diabetes mellitus can also be defined as a habitual metabolic complaint in which the use of carbohydrate is bloodied and that of lipid and protein is enhanced. It's due to complete or partial insufficiency of insulin in the body performing in habitual hyperglycemia, glycosuria, ketoacidosis and coma. Traditional Medicines deduced from medicinal shops are used by about 60 of the world's population. This review( design) focuses on Indian Herbal medicines and shops used in the treatment of diabetes, especially in India. Diabetes is an important mortal disease anguishing numerous from colorful walks of life in different countries. In India it's proving to be a major health problem, especially in the civic areas. Though there are colorful approaches to reduce the ill goods of diabetes and its secondary complications, herbal phrasings are preferred due to lower side goods and low cost. Several medicinal shops have been used to control diabetes in the traditional medicinal systems of numerous societies worldwide. numerous further medicinal shops have set up implicit use as hypoglycemic in the Indian system of drugs. In this review, there are 10 shops described. It easily shows the significance of herbal shops in the treatment of diabetes mellitus. The present review profile- gives information about scientific name, common name, family and the corridor of the factory used to treat diabetes. It include colorful herbal medicinal shops similar as Fenugreek, gurmara, Java pearl, spasm of wind, green chiretta, curry leaves, musrat root, kurdu, Banjul, Aloe Vera, matura tea .

**Keywords:** Diabetes mellitus, Herbal Plants, Hypoglycemic, Anti-diabetic activity.

## Introduction :

Diabetes mellitus is taken from the Greek word diabetes, meaning siphon- to pass through and the Latin word mellitus meaning sweet. A review of the history shows that the term " diabetes" was first used by Apollonius of Memphis around 250 to 300 BC. Ancient Greek, Indian, and Egyptian societies discovered the sweet nature of urine in this condition, and hence the propagation of the word Diabetes Mellitus came into being. Mering and Minkowski, in 1889, discovered the part of the pancreas in the pathogenesis of diabetes. In 1922 Banting, Best, and Collip purified the hormone insulin from the pancreas of cows at the University of Toronto, leading to the see of an effective treatment for diabetes in 1922. Over the times, exceptional work has taken place, and multiple discoveries, as well as operation strategies, have been created to attack this growing problem. Unfortunately, indeed moment, diabetes is one of the most common habitual conditions in the country and worldwide. In the US, it remains as the seventh leading cause of death. Diabetes mellitus is one of the oldest conditions, which has been and is a vast area under discussion, which is placing a huge burden of illness on victims and society as well. Diabetes is a well known and a veritably common complaint which has been defined in different ways. Diabetes mellitus can also be defined as a habitual metabolic complaint in which the use of carbohydrate is bloodied and that of lipid and protein is enhanced. It's due to complete or partial insufficiency of insulin in the body performing in habitual hyperglycemia, glycosuria, ketoacidosis and coma.<sup>1</sup>

Diabetes mellitus( DM) also known as simply diabetes, is a group of metabolic conditions in which there are high blood sugar situations over a prolonged period This high blood sugar produces the symptoms of frequent urination, increased thirst, and increased hunger. undressed, diabetes can beget numerous complications. Acute complications include diabetic ketoacidosis and nonketotic hyperosmolar coma. Serious long- term complications include heart complaint, stroke, order failure, bottom ulcers and damage to the eyes.<sup>2</sup> Diabetes is due to either the pancreas not producing enough insulin, or the cells of the body not responding duly to the insulin produced. There are three main types of diabetes mellitus • Type 1 DM results from the body's failure to produce enough insulin. This form was preliminarily appertained to as" insulin-dependent diabetes mellitus"( IDDM) or" juvenile diabetes". The cause is unknown • Type 2 DM begins with insulin resistance, a condition in which cells fail to respond to insulin duly. As the complaint progresses a lack of insulin may also develop. This form was preliminarily appertained to as" noninsulin-dependent diabetes mellitus"( NIDDM) or" adult- onset diabetes .<sup>3</sup>

The treatments of diabetes include diet, exercise, use of oral hypoglycemic agents and insulin is the primary forms of treatment for diabetes. piecemeal from presently available remedial options, multitudinous herbal medicines have been recommended for the treatment of diabetes mellitus, medicinal shops have the advantage of having no side goods.<sup>4</sup>Traditional plant treatments have been used throughout the world for the remedy of diabetes mellitus.<sup>5</sup>

## Classification of diabetes mellitus :

1. Type 1 diabetes mellitus
  - Immune mediated
  - Idiopathic
  - Brittle diabetes

2. Type 2 diabetes mellitus
3. Type 1.5 diabetes mellitus (Latent autoimmune disorders in adults)
4. Type 3 diabetes mellitus (Alzheimer's disease)
5. Type 4 diabetes mellitus (Gestational diabetes)
6. Other specific types
  - Maturity onset diabetes of the young (MODY)
  - Genetic defects of beta cells
  - Genetic defects in insulin actions
  - Diseases of exocrine pancreas
  - Infection

#### Symptoms:-

Diabetes symptoms depend on how high your blood sugar is. Some people, especially if they have prediabetes, gestational diabetes or type 2 diabetes, may not have symptoms. In type 1 diabetes, symptoms tend to come on quickly and be more severe. Some of the symptoms of type 1 diabetes and type 2 diabetes are:

- Feeling more thirsty than usual.
  - Urinating often.
  - Losing weight without trying.
  - Presence of ketones in the urine. Ketones are a byproduct of the breakdown of muscle and fat that happens when there's not enough available insulin.
  - Feeling tired and weak.
  - Feeling irritable or having other mood changes.
  - Having blurry vision.
- Getting a lot of infections, such as gum, skin and vaginal infections.

Type 1 diabetes can start at any age. But it often starts during childhood or teen years. Type 2 diabetes, the more common type, can develop at any age. Type 2 diabetes is more common in people older than 40. But type 2 diabetes in children is increasing.

#### Indian medicinal herbal plants used in treatment of diabetes mellitus :-

##### 1) **Foenum graecum ( Fenugreek) :**

foenum- graecum seeds have been used as traditional drugs not only in diabetes but also in high cholesterol, inflammation and gastrointestinal affections.<sup>6</sup>primary beast trials suggested possible hypoglycemic effect and antihyperlipidemic parcels of oral fenugreek seed greasepaint.<sup>7</sup>T. foenum- graecum seeds have also preliminarily been shown to have hypoglycemic and hypocholesterolemic goods on type 1 and type 2 diabetes mellitus cases and experimental diabetic creatures.<sup>8</sup> still, the report published so far on the hypoglycemic effect ofT. foenum- graecum couldn't establish the optimum cure- position for experimental subjects. In view of the below considerations, the present study has administered ethanol excerpt ofT. foenum- graecum at different boluses to the alloxan convinced diabetic rat and the hypoglycemic effect of separate boluses was compared with those of standard antidiabetic medicine( glimepiride) to the convinced diabetic rat. The study was also accepted to estimate some primary qualitative phytochemical analysis of crude excerpt of seeds as well as to examine the position of toxin of crude excerpts.<sup>9</sup>



**Fig.no.1 : Foenum graecum**

2) **Murraya koenigii (L) (curry leaves) :**

*Murraya koenigii* (L.) Spreng (family: Rutaceae) is commonly known as 'curry patta' in Hindi and is widely and regularly used as a spice and condiment in India and other tropical countries. *Murraya koenigii* leaves mixed with fat separated butter fat is used for the treatment of amoebiasis, diabetes and hepatitis in Ayurveda.<sup>10,11</sup>

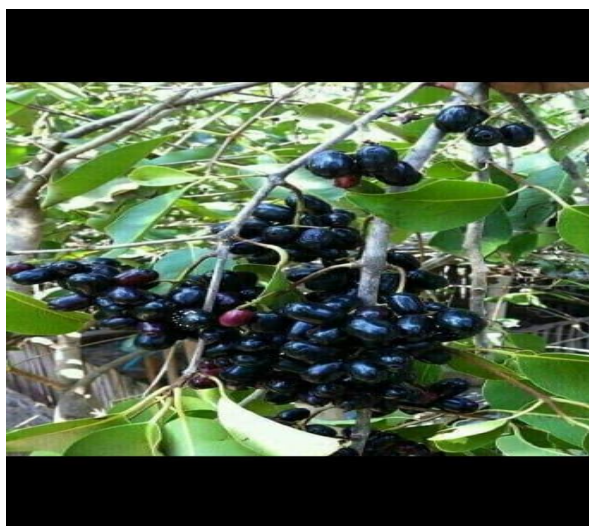
The aqueous extract of the leaves *murraya koenigii* produced hypoglycemia in normal and al-loxan diabetic dogs. Oral feed-ing of *Murraya koenigii* leaves diet for 60 days to normal rats showed hypoglycemic effect associated with increase in the hepatic glycogen. Dietary supplement with curry leaves has been shown to in-crease lecithin cholesterol acyl transferase activity.<sup>12</sup> Curry leaves are known to naturally boost insulin activity, an important action to control high blood sugar levels.<sup>13</sup>



**Fig.no.2 :** *Murraya koenigii*

3) **Syzygium Cumini (Java plum) :**

This plant originates from India and has long been used in traditional drug in South and Southeast Asia. Jamblang root contains active composites similar as jamboline, polyphenols, flavonoids, and tannins. The jamboline emulsion is known to have an anti-diabetic effect, videlicet by inhibiting the exertion of the nascence- glucosidase enzyme and affecting the immersion of glucose in the intestine, thereby helping to control blood sugar situations.<sup>14</sup> There are several studies that have been conducted to estimate the eventuality of jamblang root as an anti-diabetic medicine. A study on rats stated that the administration of jamblang root excerpt could lower blood sugar situations and increase glucose forbearance in rats with diabetes. These results indicate the eventuality of jamblang root as an anti-diabetic medicine. In a mortal clinical study, experimenters looked at the goods of jamblang root in cases with type 2 diabetes.<sup>15</sup>



**Fig.no.3:** *Syzygium Cumini*

4) **Andrographis paniculata (green chiratta) :**

*Azadirachta indica* (Neem) and *Andrographis paniculata* (Kalomegh) are two extensively reputed medicinal plants in Bangladesh, which have been used traditionally for a long time to treat colorful conditions including diabetes.<sup>16</sup> In this study, we've estimated the hypoglycemic exertion of ethanol leaves excerpt of *Azadirachta indica* and *Andrographis paniculata* to establish scientific substantiation in support of the myth claim. Chirata contains several composites that contribute to its medicinal value. The composites include Xanthones, alkaloids, and glycosides. They also correspond of ophelic acid, chiratin, steric acid, oleic acid, and palmitic acid. Swertanone, amarogenin, and chiratol are other important factors present in Chirata.



**Fig .no.4 :** Andrographis paniculata

**5) Phyllanthus Niruri (gale of wind):**

The effect of methanol extract of the aerial parts of Phyllanthus niruri (Euphorbiaceae) and its antidiabetic herb, glucose uptake, and diabetes storage were studied explain the mechanisms of blood glucose-lowering and glycemic control in diabetes. The effect of chronic oral administration of the extract on glycemic control was evaluated in alloxan-induced diabetic rats using blood-glucose-lowering activity and postprandial glucose suppression and effects on glycemic hemoglobin and body weight.<sup>17</sup> The results showed that the extract lowered blood glucose, suppressed the increase in postprandial blood glucose after eating glucose, reduced hemoglobin glycation, and increased the absolute and relative weight of liver glycogen content in diabetic rats. The extract treatment also improves weight loss caused by diabetes. In vitro, the extract inhibited the activity of  $\alpha$ -amylase (IC<sub>50</sub>: 2.15  $\pm$  0.1 mg/mL) and  $\alpha$ -glucosidase (IC<sub>50</sub>: 0.2  $\pm$  0.02 mg/mL). These findings suggest that the airborne parts of P. niruri may induce its blood glucose-lowering properties to inhibit glucose uptake and increase glucose storage.<sup>18</sup>



**Fig .no.5 :** Phyllanthus Niruri

**6) Acorus Calamus (Musrat root) :**

In India, the plants of A. calamus are set up throughout, generally in Himalayan and sub-Himalayan regions.<sup>19, 20</sup> Calamus could be a semi ocean- going condiment and is astronomically circulated by the edges of lakes and moderate streaming aqueducts, growing in shallow water or in a really damp earthy soil. It lean towards a pH within the run5.5 to7.5. It's imperishable condiment; the rhizomes generally do in pieces about 5 to 15 cm in length and 1 to 2 cm in consistence. They're covered with a thin brownish epidermis and cork and are important shrunken, bearing brief longitudinal wrinkles.<sup>21</sup> Oral administration of methanolic excerpt of A. calamus rhizome restored the situations of blood glucose in Streptozotocin convinced diabetic rats after 21 days. Further, lipid profile( total cholesterol, LDL and HDL- cholesterol), glucose 6- phosphatase, fructose 1,6 bis phosphatase situations and hepatic labels enzymes( aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase) were dropped.<sup>22</sup>



**Fig .no.6 :** Acorus Calamus

**7) celosia argentea Linn.(Kurdu):**

*Celosia argentea* Linn. generally known as "Cocks Comb" and its seeds are extensively used in Indian folk drug for the treatment of diabetes mellitus. *Celosia argentea* L is scientifically classified to plantae area. It's an angiosperm, eudicot and core eudicot. It belongs to the order Cryophyllales, of the family Amaranthaceae and sub family Amaranthoideae, genus *Celosia* and species *C. argentea* Linn. The full binomial name is *Celosia argentea* Linn.<sup>23,24</sup> the anti-diabetic exertion of alcoholic excerpt of *Celosia argentea* Linn seeds in rats and reported that habitual administration of the excerpt significantly reduced the blood glucose in alloxan- convinced diabetic rats for two weeks and also averted a drop in their body weight. Their results suggested that the excerpt possesses anti-diabetic exertion in alloxan- convinced diabetic rats.<sup>25</sup> The ethanolic excerpt of *C. argentea* root lowered blood glucose in rudimentary conditions and after a heavy glucose cargo in normal rats, reduced the increase of blood sugar set up in diabetic rats (73.43 at 250 mg/ kg and 80.20 at 500 mg/ kg body weight on 15th day), reduced the increased situations of cholesterol, triglycerides and urea, dropped position of proteins and liver glycogen in streptozotocin- convinced diabetic creatures and inhibited the body weight reduction convinced by streptozotocin administration.<sup>26</sup>



**Fig .no.7 :** *Celosia argentea* Linn

**8) Acacia arabica (Banjul) :**

It is a good source of fiber and has been recommended for diabetics.

*Acacia* species are commonly known as 'Babool' in India and ethnomedicinally have long been used for the treatment of skin, sexual, stomach and tooth problems.

It's set up each over India substantially in the wild niche. The factory excerpt acts as an antidiabetic agent by acting as a secretagogue to release insulin. It induces hypoglycemia in control rats but not in alloxanized creatures. Powdered seeds of *Acacia arabica* when administered (2,3 and 4 g/ kg bodyweight) to normal rabbits convinced hypoglycemic effect by initiating release of insulin from pancreatic beta cells.<sup>27</sup>



**Fig.no.8** : *Acacia arabica*

**9) Aloe Vera and Aloe barbadensis :**

Aloe, a popular houseplant, has a long history as a multi-purpose folk remedy. The factory can be separated into two introductory products gel and latex. Aloe vera gel is the splint pulp or gum, aloe latex, generally appertained to as “ aloe juice,, ” is a bitter unheroic exudate from the pericyclic tubules just beneath the external skin of the leaves. Excerpts of aloe goo effectively increases glucose forbearance in both normal and diabetic rats.<sup>28</sup> Treatment of habitual but not single cure of exudates of *Aloe barbadensis* leaves showed hypo- glyceemic effect in alloxanized diabetic rats. Single as well as habitual boluses of bitter principle of the same factory also showed hypoglyceemic effect in diabetic rats. This action of Aloe vera and its bitter principle is through stimulation of conflation and/ or release of insulin from pancreatic beta cells.<sup>29</sup>This factory also has an anti-inflammatory exertion in a cure dependent manner and improves crack mending in diabetic mice.<sup>30</sup>



**Fig.no.9** : *Aloe barbadensis*

**10) Senna Auriculata :**

Oral administration of the ethanolic excerpt of *S. auriculata*( at a cure of 150 mg/ kg of bw) splint significantly reduced the blood glucose position, SGOT, SGPT, peak, total cholesterol, triglyceride and low viscosity lipoprotein- cholesterol( LDL- C) situations to the normal position and significantly increased HDL- C and phospholipid( PL) position in alloxan convinced diabetic rats.<sup>31</sup> *auriculata* splint gained important significance in diabetic control as it has been used as a traditional drug for diabetes; since the phytochemical analysis has shown the presence of potent phytochemicals like flavonoids, terpenoids glycosides, steroids, saponin and phenols. Several authors reported that flavonoids, steroids terpenoids, phenolicacids are known to be bioactive antidiabetic principles.<sup>32</sup>



Fig.no. 10 : Senna Auriculata

Table No.1 Medicinal plants used to treatment of diabetes mellitus :

Common Name	Botanical Name	Family	Part used
Fenugreek	Trigonella foenum graecum	Fabaceae	Seed
Gurmar	Gymnema Sylvestre	Asclepiadaceae	Leaves
Java plum/ Jamun	Syzygium Cumini	Myrtaceae	Seed, bark.
Gale of wind	Phyllanthus niruri	Phyllanthaceae	Leafs
Green chiretta	Andrographis paniculata	Acanthaceae	Roots
Green leaves	Murraya koenigii	Rutaceae	Leaves
Musrat roots	Acorus calamus	Acoraceae	Roots
Kurdu	Celosia argentea	Amaranthaceae	Seeds
Banjul	Acacia arabica	Fabaceae	Seeds
Aloe Vera	Aloe bardensis miller	Liliaceae	Leafs
Matura tea tree	Senna auriculata	Leguminosae	Roots

**Nutraceutical Used In diabetes mellitus :**

- 1) Soya and Omega-3 fatty acids :-  
These promote insulin sensitivity and bring the blood sugar normal. Docosahexaenoic acid ( DHA) modulates insulin resistance and is also vital for neurovisual development. This is especially beneficial in women with gestational diabetes mellitus during pregnancy.
- 2) Dietary fibers :  
Present in flaxseed have been extensively used both as dietary supplements and food ingredients in processed food to aid weight

reduction, for glucose control in diabetic patients and to reduce lipid levels in hyperlipidemia.

- 3) Polyphenols:–  
have shown beneficial effect on the management of glucose in diabetes. Example Cinnamon increases glucose metabolism and helps in lowering blood glucose levels. The action may be attributed due to the presence of polyphenols. Green tea improves glucose tolerance and insulin sensitivity by lowering fasting blood levels of glucose, insulin, triglycerides, and free fatty acids. It may also improve the ability of these fat cells to respond to insulin, along with the ability to absorb blood sugar, which may be greatly increased.
- 4) Bitter melon ( *Momordica charantia* ) :–  
May activate an enzyme that is responsible for regulating metabolism and transporting glucose from the blood into the cells.
- 5) *Gymnema sylvestre* :–  
Is an Indian herb that may help support healthy blood sugar levels and glucose metabolism by mediation of insulin release and activity, and augmentation of healthy pancreatic function. Data also suggest that B cells may be regenerated/ repaired in type-2 diabetic patients.
- 6) Fenugreek :–  
Fenugreek: 4-hydroxyisoleucine (an amino acid derived from fenugreek) may help in stimulating the secretion of insulin, reducing insulin resistance, and decreasing blood sugar levels.
- 7) Garlic (*Allium sativum*) :–Lowers blood glucose level and has strong antioxidant activity.
- 8) Barley :–  
Whole grains and cereal-fibre containing products may reduce the risk of developing type2 diabetes.
- 9) Chromium :–  
supplements may enhance insulin sensitivity and improve glucose tolerance in patients with type 2 diabetes mellitus.
- 10) Vanadium:–  
supplementation at dose of 45-150mg/day also reduced fasting blood glucose in patients with type 2 diabetes mellitus.
- 11) Magnesium :–  
may be depleted in diabetes and heart disease patients. Supplement with 400 mg help in treating diabetes. A diet rich in magnesium lowers the risk for diabetes, suggesting an improvement in insulin sensitivities.

### Conclusion :

Diabetes mellitus is a most common endocrine complaint, affecting further than 300million people worldwide. For this, curatives developed along the principles of western drug( allopathic) are frequently limited in efficacy, carry the threat of adverse goods, and are frequently too expensive, especially for the developing world. thus, treating diabetes mellitus with factory- deduced composites which are accessible and don't bear laborious medicinal conflation seems largely seductive. In this review composition, an attempt has been made to collect the reported hypoglycemic shops from India and abroad and may be useful to the health professionals, scientists and scholars working the field of pharmacology and rectifiers to develop substantiation-grounded indispensable drug to cure different kinds of diabetes in man and creatures. insulation & identification of active ingredients from these plants, medication of standardized cure & lozenge authority can play a significant part in perfecting the hypoglycemic action.

### REFERENCES:

1. ^ab"Diabetes World Health Organization Archived from the original on 29 january 2023.
2. Diabetes mellitus &Type1 and Type2 diabetic Author's by Hossam A. Shouip Dec 2014.
3. A Review on Diabetes Type 1 Type 2 Roshan Kumar, pucabisha, yogendra Kumar , om prakash October 2020.
4. Ayodhya S, Kusum and Saxena A. Hypoglycaemic activity of different extract of various herbal plants, Int. J. Res Ayur Pharma 2010; 1: 212.
5. Donga JJ, surani vs, sailor G U, Chauhan sp & seth AK , A systematic review on natural medicine of some Indian medicinal plants, Int.J. Ph. sci,2 (2011)36.
6. Anjana KM, Ali Mk, pradeepa R , Deepa M, Datta M,Unnikrishnan R, Rema M. Mohan V, The need for obtaining accurate nationwide estimates of diabetes Prevalence in India - rational for a national study on diabetes.Indian J med Res diabetes 2011; 133:369-80.
7. Sharma R. D Raghuram T. C and Rao NS (1990). Effect of fenugreek seeds on blood glucose and serum lipid in typ 1 diabetes .Eur. J. clin.nutr.44(4): 301-306.
8. Xue, W.L, Li, X.S Zhang, J, Liu, Y.H., Wang, Z.L. and Zhang R-J (2007). effect of Teigonella foenum graecum (fenugreek) extract on blood. -glucose blood lipid and hemorheological properties in sleptozotocin- induced diabetic 422-426. Rats Nutr. 16 (51):422-426.



9. Abou El-Soud NH Khalil, M-Y, Hussein J.S, Oraby, F.S.H and Hussein Farragut A-R (2007) antidiabetic effect of Fenugreek Alkaloid Extract in 5 streptozotocin induced Hyperglycemic Rats. *J. Applied Sci pes* 3 (10) :1075 -83.
10. Pillai, K.G. Gopala, 1958. Chikilsamanmjari. Part1. Srichitra ayurveda series no.1, Trivandrum, p.100.
11. Bose, M.B.K. Chandra, 1985 pharmacopoeia Indica. Bishan singh mahendra pal singh, 23 A connaught place, Dehradun India, P. 20.
12. Khan, BA, Abraham A, leelamma S, 1996. Role of murraya koeniggi (curry Leaf) and Brassica juncea (mustard) in Lipid peroxidation. *Indian Journal of Physiology and Pharmacology* 40, 155- 158.
13. Azmin Tapa porewala Curry leave Powder August 3, 2016, Available from <http://www.buzzle.com/articles/curry-leaves-for-diabetes>.
14. Ghosh A, sil p.c. ant-oxidative effect of a poly phenolic fraction isolated from the fruits of Syzygium Cumini (L.) skeels on alloxan-induced diabetetic rats *Indian J Exp Biol.* 2005. 43 (D): 430-7.
15. Grover JK, Yadav S, vats v. Medicinal plants of India with anti-diabetic potential. *J ethnopharmacol.* 2002; 81(1): 81-100.
16. Ghani A Medicinal plants of Bangladesh: Chemical. constituent and use (asiatic Society of
17. Bangladesh (1st edition), Dhaka, 1998) 81-93.
18. Okoli Co, Obidike IC, E Zike Ac Akah PA, Salowau OA. studies on the possible mechanisms of antidiabetic activity of extract of aerial parts of phyllanthus niruri *Pharmaceutical biology*, 2011 Mar I;49(3): 248-55.
19. mazander UK, Gupta M, Rajeshwary Antihyperglycemic effect and antioxidant potential of Phyllanthus niruri in Streptozotocin induced diabetic rats, *Eur Bull drug Res*, 2005; 13(1): 15-23.
20. Karthikeyan S, Jain Sk, Nayar MP, Sanjappa M. *Florae Indicae Enumeratio monocotyledonae Calcutta : Botanical survey of India*, 1989.
21. Ravindran PN, balachandra I. Underutilized medicinal spices (1) *Spice India*, 2004, 17:1-14.
22. Ahmad Najib, acorus calamus on Type 2 diabetes mellitus medication *Res*, 2020 ; 5 (2): 58-64.
23. Persilla DH, Balamurugan R, Shah HR, Antidiabetic activity of methanol extract
24. of Acorus calamus in STZ induced diabetic rats, *Asian pac · J. Trop: med*, 2 (2012) 594.
25. Wunderlin RP, Hasen BF, Atlas of florida vascular plants. [www.plantatlas.usf.edu](http://www.plantatlas.usf.edu) 2008.
26. GRIN Species record of Celosia Germplasm resources information network United States Department of Agriculture 2014; Assessed on 4th Apr, 2014.
27. vetrichelvan T, Jegadeesan M, Devi BAU Antidiabetic activity of alcoholic extract of Celosia argentea Linn, seed in rats. *Biol. Phram.Bull.*, 2002; 25 (4) 526-528.
28. Ghule S Prakash T, Kotresha D Karki R, Surendea V<sub>1</sub> Goli D. Anti-diabetic activity of celosia argentea root in Streptozotocin-induced diabetic rats. *Int J Green Pharm* 2010; 4(3) : 206-211.
29. Wadood A, Wadood N., Shah S.A effect of Acacia arabica and Carallum. edulis on blood glucose level on normal and alloxan diabetic rabbits. *J. Pakistan Med. Assoc .* 1989; 39: 208-212.
30. Al-Awadi F.M, Gumaa k. A. Studies on the activity of individual plants of an antidiabetic Plant mixture *Acta Diabetologica* 1987; 24:37-41.
31. Ajabnoor M.A. Effect of aloe on blood. glucose levels in normal and alloxan diabetic mice. *J Ethnopharmacol.* 1990.
32. Davis R.H., Maro N.p. Aloe vera and gibberellins, Anti-inflammatory activity in diabetes. *J. Am. Pediat* 1989.
33. Shanmugasundaram R, Devi KK, Soris TP, Maruthupandian A & Mohan VR, Antioxidant activity of senna. auriculata (L) Roxb. Leaves in alloxan induced diabetes rats, *Int J. Pharm Tech Res* 3 (2011).
34. Rhemann AV & Zaman K, Medicinal Plants with hypoglycemic activity *Journal of*
35. *Ethnopharmacology* 26 (1989) 1