

## Review article

# A REVIEW ON SOME MEDICINAL PLANTS OF NORTHEAST INDIA USED IN THE TREATMENT OF RESPIRATORY DISORDERS

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## Abstract

**Background:** Respiratory disorders are pathological conditions that affect the organs and tissues which constitute a part of the respiratory system, causing difficulty in the exchange of gases in organisms. These disorders may be caused by numerous factors ranging from infection to air pollution. As the world progresses with various advancements in the industrial field, the emissions in the air have increased, leading to a greater number of infections communicated by air. Although there are medicines available in the market for the treatment of these diseases, there are also present many plants that naturally contain certain compounds that can be used to treat these conditions. **Objective:** The objective of this review is to find out the various plants that are found in northeast India which have been used by the local people traditionally for the treatment of respiratory disorders. **Methods:** An extensive literature survey was carried out through various databases like Google Scholar, Pubmed, Sciencedirect, etc. to support this review. All the collected information was analyzed accordingly and the plants were enlisted based on the classes of respiratory disorders for which they are used. **Discussions:** From the survey that was carried out, it was found that there are numerous therapeutic and traditional plants in the northeastern region of India that can be used for the treatment of almost all the disorders concerned with the respiratory system. Thus, there can be alternatives to the costly synthetic medicines found usually in the market. **Conclusion:** Therefore, we can replace synthetic medicines with traditional herbal medicine which would also help in reducing the side effects that are sometimes seen after consumption of the marketed drugs. The use of traditional medicines will also lead to the cultivation and use of such important plants in a sustainable manner and thus help in improving the economy of the people whose main source of income is agriculture.

**Keywords:** Respiratory disorders; Respiratory System; Northeast India; Traditional; Endangered; Ethnomedicine.

## 1.Introduction

The respiratory system or the pulmonary system is an organ system that includes certain structures and organs that are necessary for the exchange of gases. There may be differences in the anatomy and physiology of the respiratory system depends on the type, size, and evolutionary background of the organism. The respiratory system in human beings consists of the nose, pharynx, larynx, trachea, bronchi, and a pair of lungs. It brings oxygen to our body and also helps in the excretion of carbon dioxide, two important things that need to be carried out in the human body. The organs of the respiratory system work together in a coordinated manner to achieve the above events. Any changes in the normal functioning of these organs may lead to respiratory disorders [1].

Respiratory disorders are conditions in which the organs and tissues of the respiratory system which help in normal gaseous exchange are affected. These include conditions of the bronchi, bronchioles, upper respiratory tract, pleura, and pleural cavity, and the nerves and muscles involved in breathing. The major causes of these disorders include smoking and air pollution but in some cases, infants may be born with under-developed lungs which may lead to such disorders as the child grows up. While some of these disorders are mild and curable like the common cold, some might be even life-threatening like lung cancer, bacterial pneumonia, etc.

The disorders of the respiratory system may be classified into four different classes:

- i. Obstructive conditions such as asthma, bronchitis, etc.
- ii. Vascular diseases such as pulmonary hypertension, pulmonary edema, etc.
- iii. Restrictive conditions such as fibrosis, pleural effusion, etc.
- iv. Infectious and environmental diseases such as asbestosis, tuberculosis, etc. [2].

The traditional use of plants for the treatment of various diseases and disorders including respiratory disorders is an age-old practice. Even to this day, people living in various parts of the world rely on traditional medicines for the treatment of various ailments. The World Health Organization (WHO) has reported that an average of 80% of the people in developing countries still depends on traditionally used medicinal plants for their primary health care [3]. The primary reason for the use of traditionally available plants in rural regions rather than conventional medicines is the lack of connectivity to the mainland. But at the same time, we can see an increase in the knowledge of ethnopharmacology which has led to the

discovery of new and safer medicines that are developed from the traditional plants [4].

The northeast region of India includes the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. These states are rich in flora. Ranging from hills to dense forests, these states have a decent distribution of medicinal plants throughout due to their tropical climate. Due to commonly occurring diseases like the common cold, cough, asthma, etc., the locals try to keep ready remedies for these diseases. Plants like *Datura stramonium* L., *Adhatoda vasica* Nees, *Curcuma longa* L., etc. are a few of the large number of plants that are used in the treatment of respiratory diseases. The data to support this review was collected after conducting an extensive literature survey of abstracts from 1987-2020. Review articles in English language published between 2000-2020 were searched using terms like ‘medicinal plants’, ‘medicinal plants of northeast India’, ‘traditional use of medicinal plants’.

This review presents various plants used for the treatment of different diseases of the respiratory system with the objective to highlight the involvement of medicinal herbs used by various ethnic communities of northeast India, and to provide information to the researchers for proper validation of the traditional claims.

### 1.1 Asthma

The main symptom of this disease is difficulty in breathing. A few of the various plants used by the people to treat this disease are enlisted in Table 1. Leaves and bark are the mostly used parts of these plants. Traditional healers diagnose on the basis of their experience, and accordingly herbal medications are supplied to the patient.

Table 1: Medicinal plants used for treatment of asthma

| Sl. No. | Name of the plant                            | Part of the plant used | Forms of preparation              | Reference |
|---------|--|------------------------|-----------------------------------|-----------|
| 1.      | <i>Abelmoschus manihot</i> (Malvaceae)       | Flower                 |                                   | [11]      |
| 2.      | <i>Abies spectabilis</i> (Pinaceae)          |                        |                                   | [22]      |
| 3.      | <i>Achyranthes aspera</i> L. (Amaranthaceae) | Whole plant            | Ash of the plant mixed with honey | [5], [13] |

|     |  |                     |  |  |
|-----|--|---------------------|--|--|
| 4.  | <i>Acorus calamus</i> Linn.<br>(Acoraceae)                 | Rhizome             | Juice  | [16], [27],<br><br>[31]                    |
| 5.  | <i>Adhatoda vasica</i> Nees.<br>(Acanthaceae)              | Leaves<br>and roots | Decoction  | [13], [20],<br><br>[28], [33],<br><br>[35] |
| 6.  | <i>Adhatoda zeylanica</i> L.<br>(Acanthaceae)              | Roots,<br>leaves    | Extract  | [14], [16],<br>[21]                        |
| 7.  | <i>Albizia julibrissin</i><br>Durazz. (Mimosaceae)         | Bark and<br>seed    | Decoction  | [21]                                       |
| 8.  | <i>Allium cepa</i> L.<br>(Liliaceae)                       | Bulb                | Juice  | [13]                                       |
| 9.  | <i>Allium ramosam</i> L.<br>(Amaryllidaceae)               | Whole<br>plant      | 5-10 ml of crushed<br>extract of the plant<br>mixed with honey<br>is given orally  | [5]  |
| 10. | <i>Alstonia scholaris</i> L.<br>R.Br. (Apocynaceae)        | Latex,<br>bark      | Bark of about<br>1.5cm with 3-5<br>pieces of rhizome<br>of Bosh of same<br>size are used; 2<br>teaspoonsful of<br>latex mixed with<br>100ml cow's milk<br>once daily for 3<br>days | [8], [18], [43]                            |
| 11. | <i>Ananas comosus</i> Merr.<br>(Bromeliaceae)              | Fruit               | Decoction  | [21]                                       |
| 12. | <i>Aquilaria malaccensis</i><br>Lamarck<br>(Thymelaeaceae) | Bark                | Decoction  | [34]                                       |
| 13. | <i>Artemisia indica</i><br>(Asteraceae)                    | Roots,<br>leaves    | Decoction  | [34]                                       |

## Respiratory disorders: Medicinal plants Northeast

|     |  |                            |   |      |
|-----|--|----------------------------|---|------|
| 14. | <i>Artemisia nilagirica</i><br>(Asteraceae)  | Leaves                     |   | [18] |
| 15. | <i>Averrhoa carambola</i> L.<br>(Oxalidaceae)  | Fruit,<br>seeds            | Decoction of<br>crushed seeds   | [32] |
| 16. | <i>Benincasa hispida</i><br>(Cucurbitaceae)  | Roots                      | Infusion  | [21] |
| 17. | <i>Blumea balsamifera</i> DC.<br>(Asteraceae)  | Leaves                     | Decoction   | [21] |
| 18. | <i>Blumea lanceolaria</i><br>(Roxburgh) Druce<br>(Asteraceae)  | Leaves                     | Infusion  | [34] |
| 19. | <i>Boerhaavia diffusa</i> Linn.<br>(Nyctaginaceae)   | Roots                      | Juice   | [21] |
| 20. | <i>Bombax ceiba</i> L.<br>(Bombaceae)  |                            |   | [28] |
| 21. | <i>Brugmansia suaveolens</i><br>(Humboldt & Bonpland<br>ex Willdenow)<br>Berchtold & J.Presl<br>(Solanaceae) | Leaves                     | Dried leaves are<br>smoked  | [34] |
| 22. | <i>Calamus viminalis</i><br>Willd. (Arecaceae)   | Tender<br>leaves           | Decoction   | [39] |
| 23. | <i>Hydrocotyle asiatica</i><br>Linn. (Apiaceae)  | Leaves                     | Decoction   | [29] |
| 24. | <i>Clerodendrum<br/>colebrookianum</i> Walp.<br>(Verbanaceae)  | Roots                      | Decoction   | [32] |
| 25. | <i>Clerodendrum<br/>glasdulodum</i> Lindl.<br>(Lamiaceae)  | Roots,<br>bark             | Root with bark<br>extract   | [5]  |
| 26. | <i>Clerodendrum serratum</i><br>(L.) Moon. (Lamiaceae)   | Leaves                     |   | [15] |
| 27. | <i>Clerodendrum<br/>siphonanthus</i> R.Br<br>Verberaceae   | Stem,<br>leaves            |   | [10] |
| 28. | <i>Clerodendrum viscosum</i><br>Vent. (Verbenaceae)  | Leaves                     | Taken raw or<br>mixed with<br>vegetables                                    | [19] |
| 29. | <i>Costus speciosus</i><br>(Koenig) Smith<br>(Costaceae)   | Young<br>shoot,<br>rhizome | Young shoot<br>crushed, boiled<br>with a pinch of salt<br>and given orally; | [39] |

|     |   |                    |  |                     |
|-----|---|--------------------|--|---------------------|
|     |   |                    | Fresh rhizome<br>crushed, extract is<br>mixed with a glass<br>of boiled milk |                     |
| 30. | <i>Cucurma caesia</i><br>(Zingiberaceae)                            |                    |  | [30]                |
| 31. | <i>Curculigo orchiods</i><br>Gaertn. (Hypoxidaceae)                 | Roots              |  | [27]                |
| 32. | <i>Curcuma longa</i> L.<br>(Zingiberaceae)                          | Rhizome            | Decoction  | [13], [21],<br>[33] |
| 33. | <i>Datura metel</i> L.<br>(Solanaceae)                              | Leaves             | Dried leaves<br>smoked   | [31]                |
| 34. | <i>Datura stramonium</i> L.<br>(Solanaceae)                         | Leaves,<br>roots   | Leaf juice, root<br>powder, dried leaf                                       | [21], [33]          |
| 35. | <i>Desmodium gangeticum</i><br>(Fabaceae)                           | Roots              |  | [35]                |
| 36. | <i>Dioscorea pentaphylla</i><br>L. (Dioscoreaceae)                  | Roots              |  | [27]                |
| 37. | <i>Eryngium foetidum</i> L.<br>(Apiaceae)                           | Leaves             | Juice  | [32]                |
| 38. | <i>Euphorbia hirta</i> L.<br>(Euphorbiaceae)                        | Plant              | Plant mixed with<br>water  | [14]                |
| 39. | <i>Ficus religiosa</i> L.<br>(Moraceae)                             | Roots and<br>fruit | Decoction (roots),<br>juice (fruit)  | [21], [33]          |
| 40. | <i>Garuga pinnata</i> (Roxb)<br>(Burseraceae)                       | Leaves             | Juice  | [23]                |
| 41. | <i>Goniothalamus</i><br><i>sesquipedialis</i> Hk.f.<br>(Annonaceae) | Leaves             | Burnt smoke<br>inhaled   | [31]                |
| 42. | <i>Gynura conyza</i> Cass.<br>(Asteraceae)                          | Leaves             | Decoction  | [21], [33]          |
| 43. | <i>Hedychium coccineum</i><br>(Zingiberaceae)                       | Whole<br>plant     |  | [18]                |
| 44. | <i>Justicia adhatoda</i> L.<br>(Acanthaceae)                        | Leaves             | Decoction  | [31]                |
| 45. | <i>Kaempferia galanga</i><br>L.<br>(Zingiberaceae)                  | Rhizome            | Decoction  | [38]                |
| 46. | <i>Lantana camara</i> L.<br>(Verbenaceae)                           | Leaves             | Decoction  | [32], [41]          |
| 47. | <i>Laportea crenulata</i><br>Roxb. Gaud.<br>(Urticaceae)            | Roots              | Decoction  | [32]                |
| 48. | <i>Mangifera indica</i>   | Flowers,           |  | [35]                |

|     |  |                            |  |                     |  |
|-----|--|----------------------------|--|---------------------|--|
|     | (Anacardiaceae)  | leaves,<br>bark            |  |                     |  |
| 49. | <i>Myrica esculenta</i> Buch.<br>Ham. ex. D. Don.<br>(Myricaceae)    | Bark                       | Powder   | [21], [32],<br>[33] |  |
| 50. | <i>Nelumbium speciosum</i><br>Willd. (Nymphaeaceae)                  | Flower                     | Juice  | [21]                |  |
| 51. | <i>Nyctanthus arbor-<br/>tristis</i> L. (Oleaceae)                   | Leaves                     | Juice  | [40]                |  |
| 52. | <i>Ocimum gratissimum</i> L.<br>(Lamiaceae)                          | Leaves                     |  | [12]                |  |
| 53. | <i>Oroxylum indicum</i> (L.)<br>Vent. (Bignoniaceae)                 | Plant                      |  | [32], [36]          |  |
| 54. | <i>Paederia foetida</i> L.<br>(Rubiaceae)                            | Young<br>shoot             | Decoction  | [21], [33]          |  |
| 55. | <i>Panax pseudo-ginseng</i><br>Wall. (Araliaceae)                    | Tuber,<br>root             | Decoction  | [28]                |  |
| 56. | <i>Phlogacanthus<br/>thyrsiflorus</i> Nees.<br>(Acanthaceae)         | Leaves                     | Juice  | [40]                |  |
| 57. | <i>Phlogacanthus<br/>thyrsiformis</i> (Roxb.)<br>Nees. (Acanthaceae) | Leaves,<br>flowers         |  | [28]                |  |
| 58. | <i>Phyllanthus fraternus</i><br>G.L.Webster<br>(Phyllanthaceae)      | Whole<br>plant             |  | [34]                |  |
| 59. | <i>Piper longum</i> L.<br>(Piperaceae)                               | Fruit                      | Infusion   | [32]                |  |
| 60. | <i>Piper nigrum</i><br>(Piperaceae)                                  | Roots                      | Crushed roots,<br>pasted and<br>consumed with<br>honey | [37]                |  |
| 61. | <i>Pothos cathcartii</i><br>Schott.<br>(Arecaceae)                   | Leaves                     | Decoction  | [38]                |  |
| 62. | <i>Prunus cerasoides</i> D.<br>Don. (Rosaceae)                       | Bark                       |  | [32]                |  |
| 63. | <i>Rothea serrate</i> L.<br>Steane & Mabb.<br>(Verbenaceae)          | Leaves,<br>stem,<br>leaves | Decoction  | [32]                |  |
| 64. | <i>Solanum ferox</i> L. Syn. S.<br><i>indicum</i> L. (Solanaceae)    | Plant                      | Powder and<br>decoction                                | [27], [41]          |  |
| 65. | <i>Solanum nigrum</i> L.<br>(Solanaceae)                             | Roots                      | Macerated  | [21]                |  |
| 66. | <i>Solanum<br/>stramonifolium</i> Jacq.                              | Whole<br>plant             |  | [38]                |  |

(Solanaceae)

|     |   |                     |            |
|-----|---|---------------------|------------|
| 67. | <i>Solanum xanthocarpum</i><br>L. (Solanaceae)                  | Whole<br>plant      | [32], [38] |
| 68. | <i>Swertia chirata</i> (Wall.)<br>C.B. Clarke<br>(Gentianaceae) | Whole<br>plant      | [28]       |
| 69. | <i>Tylophora indica</i> (Burm.<br>f.) Merr. (Apocynaceae)       | Leaves              | [20]       |
| 70. | <i>Viburnum foetidum</i> Wall<br>(Adoxaceae)                    | Leaves<br>and roots | [28]       |

### 1.2 Bronchitis

For the treatment of bronchitis, people of the northeast region of India use various parts like leaves, bark, bulb etc. of the plants listed in Table 2. Since at the initial stage, patients are not tested with modern medical facilities, hence, pneumonia and bronchitis are not differentiated by the healers [33].

Table 2: Medicinal plants used for the treatment of bronchitis

| Sl. No. | Name of the plant  | Part of the plant used | Forms of preparation                                  | Reference                       |
|---------|--|------------------------|---|---------------------------------|
| 1.      | <i>Acorus calamus</i><br>Linn. (Acoraceae)               | Rhizome                | Juice   | [16], [31], [41]                |
| 2.      | <i>Adhatoda vasica</i><br>Nees. (Acanthaceae)            | Leaves and<br>roots    | Decoction   | [21], [28],<br>[32], [33], [35] |
| 3.      | <i>Aegle marmelos</i><br>L. Correa ex Roxb<br>(Rutaceae) | Leaves                 | 5-10 tender leaves<br>are also eaten raw<br>with milk | [5]                             |
| 4.      | <i>Allium sativum</i> L.,<br>(Liliaceae)                 | Bulb                   |   | [35]                            |
| 5.      | <i>Alpina galanga</i><br>Willd.<br>(Zingiberaceae)       | Rhizome                | Infusion  | [31]                            |
| 5.      | <i>Arenga<br/>saccharifera</i><br>Labill.<br>(Aracaceae) | Roots                  | Decoction   | [31]                            |
| 7.      | <i>Alstoia scholaris</i> (L)<br>R. Br. (Apocynacea)      | Bark                   |   | [41]                            |
| 8.      | <i>Blumea lanceolaria</i><br>(Roxburgh) Druce            | Leaves                 | Infusion  | [34]                            |



|     |  |                           |  |            |
|-----|--|---------------------------|--|------------|
|     | (Asteraceae)   |                           |  |            |
| 9.  | <i>Capsicum annum</i><br>(Solanaceae)  | Fruit                     |  | [35]       |
| 10. | <i>Cassia fistula</i> L.<br>(Fabaceae)                                       | Roots                     | Decoction                                    | [32]       |
| 11. | <i>Cinnamomum</i><br><i>glaucaescens</i> (Nees)<br>Hand-Mezz.<br>(Lauraceae) | Stem bark                 | Juice  | [31]       |
| 12. | <i>Cinnamomum</i><br><i>glanduliferum</i><br>Meissn. (Lauraceae)             | Stem bark                 | Juice  | [21], [33] |
| 13. | <i>Citrus maxima</i><br>(Rutaceae)   | Fruit                     |  | [35]       |
| 14. | <i>Clerodendrum</i><br><i>gladulodum</i> Lindl.<br>(Lamiaceae)               | Roots, bark               | Root with bark<br>extract                    | [5]        |
| 15. | <i>Clerodendrum</i><br><i>serratum</i> (L.) Moon.<br>(Lamiaceae)             | Leaves                    |  | [15]       |
| 16. | <i>Clerodendrum</i><br><i>siphonanthus</i> R.Br.<br>(Verbenaceae)            | Stem, leaves              |  | [10]       |
| 17. | <i>Clerodendrum</i><br><i>viscosum</i> Vent.<br>(Verbenaceae)                | Roots                     |  | [41]       |
| 18. | <i>Costus speciosus</i><br>(J. Konig ex Retz<br>Smith)<br>(Zingiberaceae)    | Rhizome                   | Powder                                       | [13], [23] |
| 19. | <i>Curcuma longa</i> L.<br>(Zingiberaceae)                                   | Rhizome                   |  | [21]       |
| 20. | <i>Curcuma</i><br><i>zedoaria</i> (Christ.)<br>Rosc.<br>(Zingiberaceae)      | Rhizome                   | Cold infusion                                | [31]       |
| 21. | <i>Dichroa febrifuga</i><br>Lour.<br>(Hydrangeaceae)                         | Fresh leaves              | Juice  | [32]       |
| 22. | <i>Embllica officinalis</i><br>Gaertn.<br>(Euphorbiaceae)                    | Fruit                     | Dried fruits are<br>soaked in mustard<br>oil | [11], [21] |
| 23. | <i>Hedychium</i><br><i>aurantiacum</i> Wall.                                 | Inflorescence,<br>rhizome |  | [10]       |

|     |   |                         |   |      |
|-----|---|-------------------------|---|------|
|     | (Zingiberaceae)   |                         |   |      |
| 24. | <i>Hedychium marginatum</i><br>(Zingiberaceae)                  | Rhizome                 |   | [15] |
| 25. | <i>Oroxylum indicum</i> (L.) Vent.<br>(Bignoniaceae)            | Root bark               |   | [36] |
| 26. | <i>Jatropha curcas</i><br>(Euphorbiaceae)                       | Leaves                  |   | [35] |
| 27. | <i>Litsea khasiana</i> (Meissn)<br>(Lauraceae)                  | Roots                   | Powder  | [23] |
| 28. | <i>Mucuna pruriens</i><br>DC. (Fabaceae)                        | Seeds                   |   | [41] |
| 29. | <i>Myrica esculenta</i><br>Buch.-Ham.<br>(Myricaceae)           | Bark, unripe<br>fruits  | Decoction of bark,<br>juice of unripe<br>fruits | [32] |
| 30. | <i>Nyctanthus arbor-tristis</i> L. (Oleaceae)                   | Leaves                  | Juice   | [40] |
| 31. | <i>Ocimum enuiflorum</i><br>(Lamiaceae)                         | Seeds, leaves           |   | [35] |
| 32. | <i>Phlogacanthus thyriformis</i> (Roxb.)<br>Nees. (Acanthaceae) | Leaves,<br>flowers      |   | [28] |
| 33. | <i>Phyllanthus fraternus</i><br>G.L.Webster<br>(Phyllanthaceae) | Whole plant             |   | [34] |
| 34. | <i>Piper brachstachylum</i><br>Wall. (Piperaceae)               | Leaves                  | Decoction                                       | [14] |
| 35. | <i>Piper longum</i> L.<br>(Piperaceae)                          | Fruit                   | Infusion  | [32] |
| 36. | <i>Piper nigrum</i> Linn.<br>(Piperaceae)                       | Fruits                  |   | [16] |
| 37. | <i>Pittosporum floribunda</i> W. &<br>A.<br>(Pittosporaceae)    | Stem bark               | Decoction                                       | [31] |
| 38. | <i>Rotheca serrate</i> L.<br>Steane & Mabb.<br>(Verbenaceae)    | Leaves, stem,<br>leaves | Decoction                                       | [32] |
| 39. | <i>Solanum indicum</i><br>Linn. (Solanaceae)                    | Fruits, leaves          |   | [41] |

|     |  |               |   |            |
|-----|--|---------------|---|------------|
| 40. | <i>Sonchus wightianus</i><br>DC. (Asteraceae)            | Whole plant   |   | [28]       |
| 41. | <i>Tagetes erecta</i> L.<br>(Asteraceae)                 | Leaves        |   | [28]       |
| 42. | <i>Taxus wallichiana</i><br>Zucc. (Taxaceae)             | Leaves        |   | [26]       |
| 43. | <i>Terminalia bellerica</i><br>Roxb.<br>(Combretaceae)   | Fruit peel    | Juice   | [21], [33] |
| 44. | <i>Vitex negundo</i> L.<br>(Verbenaceae)                 | Leaves        | Decoction   | [31]       |
| 45. | <i>Zanthoxylum<br/>acanthopodium</i> D.<br>C. (Rutaceae) | Fruit, leaves |   | [10], [15] |
| 46. | <i>Zanthoxylum<br/>armatum</i> D. C.<br>(Rutaceae)       | Fruits        | Dried fruits are<br>consumed directly                 | [14]       |
| 47. | <i>Zingiber gracile</i><br>Jack<br>(Zingiberaceae)       | Leaves        | Aromatic oil<br>extracted from<br>leaves taken orally | [31]       |
| 48. | <i>Zingiber officinale</i><br>(Zingiberaceae)            | Rhizome       |   | [35]       |
| 49. | <i>Zingiber<br/>purpurum</i> Rosc.<br>(Zingiberaceae)    | Rhizome       | Powdered rhizome                                      | [31]       |

### 1.3 Common cold

The main symptoms of common cold include runny nose, nasal congestion, watery eyes etc. The plants used by the locals of northeast India to get relief from these symptoms are listed in Table 3.

Table 3: Medicinal plants used for the treatment of common cold

| Sl. No. | Name of the plant   | Part of the plant used | Forms of preparation                            | Reference  |
|---------|---|------------------------|---|------------|
| 1.      | <i>Aconitum ferrox</i><br>Wallich ex setinge<br>(Ranunculaceae) | Whole plant            |   | [16]       |
| 2.      | <i>Adhatoda zeylanica</i><br>L. (Acanthaceae)                   | Roots,<br>leaves       | Extract   | [14], [21] |
| 3.      | <i>Allium sativum</i> L.<br>(Liliaceae)                         | Cloves                 | Fried with mustard<br>oil and rubbed on<br>feet | [8], [21]  |
| 4.      | <i>Andrographis</i>   | Aerial                 | Decoction                                       | [32]       |

|     |  |                     |   |            |
|-----|--|---------------------|---|------------|
|     | <i>paniculata</i> (Burm. f.) Wall. ex Nees<br>(Acanthaceae)  | parts               |   |            |
| 5.  | <i>Blumea balsamifera</i> DC. (Asteraceae)                   | Stem, root          | Decoction   | [21], [33] |
| 6.  | <i>Blumeopsis flava</i> (D. Don) Merr. (Asteraceae)          | Leaves              | Decoction   | [30]       |
| 7.  | <i>Chrysanthemum indicum</i> (Compositae)                    | Whole plant         |   | [18]       |
| 8.  | <i>Cinnamomum tamala</i> (Linn.) Nees and Eberm. (Lauraceae) | Leaves              |   | [10]       |
| 9.  | <i>Citrus maxima</i> (Rutaceae)                              | Fruit               |   | [10]       |
| 10. | <i>Citrus medica</i> L., (Rutaceae)                          | Leaves              | Decoction   | [21]       |
| 11. | <i>Costus speciosus</i> (Koenig) Smith (Costaceae)           | Rhizome             | Fresh rhizome crushed, extract is mixed with a glass of boiled milk | [39]       |
| 12. | <i>Curcuma aromatica</i> (Zingiberaceae)                     | Rhizome             |   | [16]       |
| 13. | <i>Curcuma cassia</i> Roxb. (Zingiberaceae)                  | Rhizome             | Cold infusion   | [31]       |
| 14. | <i>Desmodium heterocarpum</i> (L.) D.C. (Leguminosae)        | Leaves, bark        | Extract   | [28]       |
| 15. | <i>Dichroa febrifuga</i> Lour. (Hydrangeaceae)               | Fresh leaves        | Juice   | [32]       |
| 16. | <i>Dillenia indica</i> L. (Dilleniaceae)                     | Fruit               | Juice   | [32]       |
| 17. | <i>Elesine coraana</i> (Poaceae)                             | Whole plant         |   | [18]       |
| 18. | <i>Emblica officinalis</i> (Phyllanthaceae)                  | Bark, fruit         |   | [35]       |
| 19. | <i>Gerbera piloselloides</i> (Compositae)                    | Leaves and rhizomes |   | [18]       |

|     |   |                        |  |  |
|-----|---|------------------------|--|--|
| 20. | <i>Gnaphalium affine</i><br>(Asteraceae)                          | Flower,<br>dried plant |  | [18]   |
| 21. | <i>Hedyotis scandens</i> (Roxb)<br>(Rubiaceae)                    | Leaves                 | Decoction of dried leaves  | [23]   |
| 22. | <i>Justicia adhatoda</i> L.<br>(Acanthaceae)                      | Roots                  | Decoction obtained by boiling the root along with <i>Tinospora cordifolia</i> and fruits of <i>Solanum xanthocarpum</i> is given in cold | [5]  |
| 23. | <i>Leucas aspera</i><br>Spreng.<br>(Lamiaceae)                    | Flowers                |  | [36]   |
| 24. | <i>Ocimum basilicum</i><br>Linn. (Lamiaceae)                      | Seeds,<br>leaves       |  | [16]   |
| 25. | <i>Ocimum enuiflorum</i><br>(Lamiaceae)                           | Seeds,<br>leaves       |  | [35]   |
| 26. | <i>Phlogacanthus thyrsoiflorus</i> Nees.<br>(Acanthaceae)         | Leaves                 | Juice  | [40]   |
| 27. | <i>Phlogacanthus thyrsoiformis</i> (Roxb.)<br>Nees. (Acanthaceae) | Shrub                  |  | [37]   |
| 28. | <i>Piper nigrum</i><br>(Piperaceae)                               | Roots                  | Crushed roots, pasted and consumed with honey  | [37]   |
| 29. | <i>Trichosanthes tricuspidata</i> D.Don.<br>(Cucurbitaceae)       | Stem,<br>roots         |  | [16]   |
| 30. | <i>Vitex negundu</i> L.<br>(Verbenaceae)                          | Leaves                 | Curry  | [21]   |
| 31. | <i>Zingiber officinale</i><br>Rosc.<br>(Zingiberaceae)            | Rhizome                |  | [7], [8], [13], [14], [16], [17], [18], [21], [25], [29] |

#### 1.4 Cough

The symptoms associated with this disease are wheezing, phlegm, irritation of the throat etc. Since it is one of the most commonly occurring disease of the

respiratory system, so there are more number of plants utilized for the treatment of cough which are listed in Table 4.

Table 4: Medicinal plants used for the treatment of cough

| Sl. No. | Name of the plant                                   | Part of the plant used | Forms of preparation   | Reference                          |
|---------|---|------------------------|--|------------------------------------|
| 1.      | <i>Achyranthes aspera</i> L.<br>(Amaranthaceae)     | Roots                  | Juice  | [13], [21], [42]                   |
| 2.      | <i>Acorus calamus</i> L.<br>(Araceae)               | Rhizome                | Garland made from pieces of rhizome is given to put on neck of new born babies to check cough & fever. | [8], [10], [14], [15], [28], [31]  |
| 3.      | <i>Adhatoda vasica</i> Nees<br>(Acanthaceae)        | Leaves, roots          | Juice (leaves), decoction (leaves and roots)   | [15], [21], [33], [35], [42], [45] |
| 4.      | <i>Adhatoda zeylanica</i> L.<br>(Acanthaceae)       | Roots, leaves          | Extract  | [14], [21]                         |
| 5.      | <i>Adiantum philippense</i> L.<br>(Pteridaceae)     | Leaves                 |  | [28]                               |
| 6.      | <i>Adiantum raddianum</i> C. Presl<br>(Pteridaceae) | Whole plant            |  | [28]                               |
| 7.      | <i>Aegle marmelos</i> Corr.<br>(Rutaceae)           | Leaves                 | Juice  | [21]                               |
| 8.      | <i>Albizia lebbek</i> (L.) Willd.<br>(Mimosaceae)   | Stem bark              | Decoction  | [27]                               |
| 9.      | <i>Albizia macrophylla</i> L.<br>(Mimosaceae)       | Stem bark              | Decoction  | [27]                               |
| 10.     | <i>Allium cepa</i> L.<br>(Liliaceae)                | Bulb                   | Juice  | [13], [35]                         |
| 11.     | <i>Allium sativum</i> L.,<br>(Liliaceae)            | Bulb                   | Fried  | [8], [21], [27], [35]              |
| 12.     | <i>Ananas comosus</i> Merr.<br>(Bromeliaceae)       | Fruit                  |  | [35]                               |
| 13.     | <i>Andrographis paniculata</i> Nees.                | Leaves                 | Decoction  | [8], [35]                          |

|     |  |                         |                            |                  |
|-----|--|-------------------------|----------------------------|------------------|
|     | (Acanthaceae)  |                         |                            |                  |
| 14. | <i>Areca catechu</i> L.<br>(Arecaceae)                         | Fruit                   | Taken directly             | [13]             |
| 15. | <i>Averrhoa carambola</i> L.<br>(Oxalidaceae)                  | Fruit, seeds            | Decoction of crushed seeds | [32]             |
| 16. | <i>Azadiracta indica</i><br>(Meliaceae)                        | Leaves                  |                            | [35]             |
| 17. | <i>Balanophora dioica</i> R. Br. Ex Royle<br>(Balanophoraceae) | Flowers, inflorescences |                            | [28]             |
| 18. | <i>Begonia roxburghii</i> DC.<br>(Begoniaceae)                 | Leaves                  |                            | [28], [45]       |
| 19. | <i>Benincasa hispida</i> (Thunb.) Cogn.<br>(Cucurbitaceae)     | Leaves                  | Juice                      | [21]             |
| 20. | <i>Blumea balsamifera</i> DC.<br>(Asteraceae)                  | Leaves                  | Decoction                  | [21], [30], [33] |
| 21. | <i>Blumeopsis flava</i> (D. Don) Merr.<br>(Asteraceae)         | Whole plant             |                            | [10]             |
| 22. | <i>Borginia ciliate</i> (Haw.) Sternb.<br>(Saxifragaceae)      | Plant                   |                            | [32]             |
| 23. | <i>Brassiopsis glomerulata</i><br>(Araliaceae)                 | Fruit                   |                            | [16]             |
| 24. | <i>Calamus viminalis</i> Willd.<br>(Arecaceae)                 | Tender leaves           | Decoction                  | [39]             |
| 25. | <i>Careya arborea</i> Roxb.<br>(Lecythidaceae)                 | Fresh bark and flower   | Mixed with honey           | [21], [38]       |
| 26. | <i>Cinnamomum glanduliferum</i> Meissn.<br>(Lauraceae);        | Stem bark               | Juice                      | [21], [33]       |
| 27. | <i>Cinnamomum glaucascens</i> (Nees) Hand-Mezz.<br>(Lauraceae) | Stem bark               | Juice                      | [31]             |

|     |  |                       |   |            |
|-----|--|-----------------------|---|------------|
| 28. | <i>Cinnamomum tamala</i> (Linn.)<br>Nees and Eberm.<br>(Lauraceae) | Leaves                |   | [10]       |
| 29. | <i>Cissampelos pareira</i> L.<br>(Menispermaceae)                  | Roots                 |   | [20]       |
| 30. | <i>Citrus medica</i> L.<br>(Rutaceae)                              | Leaves                |   | [14]       |
| 31. | <i>Clerodendrum colebrookianum</i><br>Walp.<br>(Verbanaceae)       | Roots                 | Decoction   | [32]       |
| 32. | <i>Clerodendrum glasdulodum</i><br>Lindl.<br>(Lamiaceae)           | Roots, bark           | Root with bark extract  | [5]        |
| 33. | <i>Clerodendrum serratum</i> (L.)<br>Moon.<br>(Lamiaceae)          | Leaves                |   | [10], [15] |
| 34. | <i>Clerodendrum siphonanthus</i> R.Br<br>Verberaceae               | Stem, leaves          |   | [10]       |
| 35. | <i>Coccinia indica</i><br>W. et. A.<br>(Cucurbitaceae)             | Fruit, stem, leaves   | Decoction   | [21], [33] |
| 36. | <i>Colocasia esculenta</i><br>(Araceae)                            | Leaves, stem, rhizome |   | [18]       |
| 37. | <i>Colocasia gigantea</i> (Blume)<br>Hook. f. (Araceae)            | Whole plant           | Ash obtained by burning the petiole mixed with honey is prescribed against unproductive cough | [5]        |
| 38. | <i>Curculigo orchioids</i> Gaertn.<br>(Hypoxidaceae)               | Roots                 |   | [27]       |
| 39. | <i>Curcuma amada</i><br>Roxb.<br>(Zingiberaceae)                   | Rhizome               |   | [27]       |
| 40. | <i>Curcuma aromatic</i><br>(Zingiberaceae)                         | Rhizome               |   | [16]       |



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|     |   |              |                              |                  |
|-----|---|--------------|------------------------------|------------------|
| 41. | <i>Curcuma cassia</i><br>Roxb.<br>(Zingiberaceae)                     | Rhizome      | Cold infusion                | [31]             |
| 42. | <i>Curcuma longa</i> L.<br>(Zingiberaceae)                            | Rhizome      | Juice                        | [21]             |
| 43. | <i>Cymbopogon</i><br><i>citrates</i> (Poaceae)                        | Leaves       |                              | [35]             |
| 44. | <i>Desmodium</i><br><i>gangeticum</i><br>(Fabaceae)                   | Roots        |                              | [35]             |
| 45. | <i>Desmodium</i><br><i>heterocarpum</i> (L.)<br>D.C.<br>(Leguminosae) | Leaves, bark | Extract                      | [28]             |
| 46. | <i>Dichroa febrifuga</i><br>Lour.<br>(Hydrangeaceae)                  | Fresh leaves | Juice                        | [32]             |
| 47. | <i>Dillenia indica</i> L.<br>(Dilleniaceae)                           | Fruit        | Juice                        | [14], [21], [32] |
| 48. | <i>Dioscorea</i><br><i>pentaphylla</i> L.<br>(Dioscoreaceae)          | Roots        |                              | [27]             |
| 49. | <i>Elesine coraana</i><br>(Poaceae)                                   | Whole plant  |                              | [18]             |
| 50. | <i>Emblica</i><br><i>officinalis</i><br>(Phyllanthaceae)              | Bark, fruit  |                              | [35]             |
| 51. | <i>Euphorbia</i><br><i>neriifolia</i> Linn.<br>(Euphorbiaceae)        | Leaves       | Juice                        | [21], [36]       |
| 52. | <i>Ficus religiosa</i> L.<br>(Moraceae)                               | Bark         | Decoction                    | [21], [33]       |
| 53. | <i>Glycyrrhiza</i><br><i>glabra</i> (Fabaceae)                        | Roots, bark  |                              | [35]             |
| 54. | <i>Gmelia arborea</i><br>Roxb.<br>(Verbenaceae)                       | Leaves       | Juice                        | [20], [21], [33] |
| 55. | <i>Hedychium</i><br><i>coronarium</i><br>(Zingiberaceae)              | Rhizome      |                              | [15]             |
| 56. | <i>Hedychium</i><br><i>spicatum</i> Ham. Ex<br>Sm.<br>(Zingiberaceae) | Rhizome      |                              | [27]             |
| 57. | <i>Hedyotis</i><br><i>scandens</i> (Roxb)                             | Leaves       | Decoction of dried<br>leaves | [23]             |

|     |   |                       |  |                  |
|-----|---|-----------------------|--|------------------|
|     | (Rubiaceae)   |                       |  |                  |
| 58. | <i>Houttuynia cordata</i> Thunb. (Saururaceae)              | Whole plant           | 5-10 ml of leaves decoction obtained from boiling is used internally | [5], [14], [18]  |
| 59. | <i>Hydrocotyle asiatica</i> L. (Apiaceae)                   | Leaves                | Dried and powdered   | [21], [33]       |
| 60. | <i>Hydrocotyle sibthorpioides</i> Lam. (Apiaceae)           |                       |  | [6]              |
| 61. | <i>Justicia adhatoda</i> L. (Acanthaceae)                   | Leaves                | Decoction  | [31]             |
| 62. | <i>Laportea crenulata</i> Roxb. Gaud. (Urticaceae)          | Roots                 | Decoction  | [32]             |
| 63. | <i>Leea indica</i> (Burm. f) Merr. (Leeaceae)               | Plant                 |  | [27]             |
| 64. | <i>Leucas aspera</i> Spreng. (Laminaceae)                   | Leaves and twigs      |  | [36], [37]       |
| 65. | <i>Mangifera indica</i> (Anacardiaceae)                     | Flowers, leaves, bark |  | [35]             |
| 66. | <i>Meriandra benghalensis</i> (Roxb.) Benth. (Lamiaceae)    | Leaves                |  | [15]             |
| 67. | <i>Mesua ferrea</i> L. (Callophyllaceae)                    | Flower                |  | [20], [31]       |
| 68. | <i>Michelia champaca</i> L. (Magnoliaceae)                  | Bark                  | Powder   | [21], [33]       |
| 69. | <i>Morus alba</i> L. (Moraceae)                             | Leaves                | Juice  | [32]             |
| 70. | <i>Musa superba</i> Roxb. (Musaceae)                        |                       | Exudate  | [21], [33]       |
| 71. | <i>Mussaenda macrophylla</i> Wall. (Rubiaceae)              | Leaves, roots         | Decoction  | [21], [33]       |
| 72. | <i>Myrica esculenta</i> Buch. Ham. ex. D. Don. (Myricaceae) | Bark                  | Powder   | [21], [32], [33] |

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|     |   |                 |  |   |
|-----|---|-----------------|--|---|
| 73. | <i>Myrica nagi</i> Hk. f.<br>(Myriaceae)                          | Bark            | Decoction  | [21]  |
| 74. | <i>Nyctanthus arbor-tristis</i> L.<br>(Oleaceae)                  | Leaves          | Juice  | [12], [40]                                    |
| 75. | <i>Ocimum basilicum</i> Linn. (Lamiaceae)                         | Seeds, leaves   |  | [16]  |
| 76. | <i>Ocimum enuiflorum</i><br>(Lamiaceae)                           | Seeds, leaves   |  | [35]  |
| 77. | <i>Ocimum gratissimum</i> L.<br>(Lamiaceae)                       | Leaves          |  | [12], [13]                                    |
| 78. | <i>Ocimum sanctum</i> L. (Lamiaceae)                              | Whole plant     |  | [8], [12], [14], [18], [21], [24], [36], [45] |
| 79. | <i>Oroxylum indicum</i> (L.) Vent.<br>(Bignoniaceae)              | Plant           |  | [32]  |
| 80. | <i>Perilla ocymoides</i> L. (Lamiaceae)                           | Leaves, fruit   |  | [10]  |
| 81. | <i>Phlogacanthus thyrsoiflorus</i> Nees.<br>(Acanthaceae)         | Leaves          | Juice  | [40], [42]                                    |
| 82. | <i>Phlogacanthus thyrsoiformis</i> (Roxb.) Nees.<br>(Acanthaceae) | Leaves, flowers |  | [15], [18], [27]                              |
| 83. | <i>Phyllanthus emblica</i> (L.)<br>(Labiataeae)                   | Fruit           | Crushed fruit mixed with honey, consumed before and after food | [9]   |
| 84. | <i>Phyllanthus fraternus</i> Web.<br>(Euphorbiaceae)              | Plant           | Powder of dried plants mixed with honey                        | [32]  |
| 85. | <i>Pinus kesiya</i> Royle ex Gordon,<br>(Pinaceae)                | Young shoots    |  | [21]  |
| 86. | <i>Piper brachstachylum</i> Wall. (Piperaceae)                    | Leaves          | Decoction  | [14]  |
| 87. | <i>Piper griffithii</i> (DC)<br>(Piperaceae)                      | Seeds           | Dried and powdered   | [23]  |
| 89. | <i>Piper longum</i> L.<br>(Piperaceae)                            | Fruit           | Infusion   | [21], [32], [33]                              |

|      |  |             |  |            |
|------|--|-------------|--|------------|
| 90.  | <i>Piper mullesua</i><br>Ham. ex D. Don<br>(Piperaceae)                              | Seeds       | Seed powder<br>mixed with honey                      | [14], [16] |
| 91.  | <i>Piper nigrum</i><br>Linn. (Piperaceae)  | Fruits      |  | [16]       |
| 92.  | <i>Pittosporum</i><br><i>nepaulense</i> (DC.)<br>Rehder & Wilson<br>(Pittosporaceae) | Bark        | Decoction  | [21]       |
| 93.  | <i>Plantago major</i> L.<br>(Plantaginaceae)   | Leaves      | Decoction  | [32]       |
| 94.  | <i>Psidium</i><br><i>guajava</i> Linn.<br>(Myrtaceae)                                | Leaves      | Raw/decoction<br>with citrus fruit<br>juice and salt | [17]       |
| 95.  | <i>Psophocarpus</i><br><i>tetragonolobus</i><br>(Linn.) D.C.<br>(Papilionaceae)      | Young fruit |  | [15]       |
| 96.  | <i>Rubus</i><br><i>micropetalus</i><br>Gardner,<br>(Rosaceae)                        | Fruit       |  | [21]       |
| 97.  | <i>Rungia parviflora</i><br>Nees<br>(Acanthaceae)                                    | Plant       | Decoction  | [27]       |
| 98.  | <i>Sapindus</i><br><i>mukorossi</i> Gaertn.<br>(Sapindaceae)                         | Fruit       | Water of soaked<br>fruits                            | [21], [33] |
| 99.  | <i>Schefflera</i><br><i>venulosa</i> (Wight<br>and Arn.) Harms.<br>(Araliaceae)      | Bark        |  | [28]       |
| 100. | <i>Solanum ferox</i> L.<br>Syn. <i>S. indicum</i> L.<br>(Solanaceae)                 | Plant       | Powder and<br>decoction                              | [27]       |
| 101. | <i>Solanum nigrum</i><br>L. (Solanaceae)   | Fruits      | Crushed and<br>mixed with water                      | [21]       |
| 102. | <i>Sonchus</i><br><i>wightianus</i> DC.<br>(Asteraceae)                              | Whole plant |  | [28]       |
| 103. | <i>Stixis suaveolens</i><br>Roxb.<br>(Resedaceae)                                    | Fruits      |  | [28]       |
| 104. | <i>Strobilanthes</i><br><i>cussia</i> Nees.<br>(Acanthaceae)                         | Leaves      | Juice  | [21], [33] |

|      |   |               |   |  |
|------|---|---------------|---|--|
| 105. | <i>Taxus wallichiana</i><br>Zucc. (Taxaceae)  | Leaves        |   | [20]   |
| 106. | <i>Terminalia bellerica</i> Roxb.<br>(Combretaceae)                                       | Fruit         |   | [28]   |
| 107. | <i>Terminalia chebula</i> Retz.<br>(Combretaceae)   | Fruit         | Powder  | [13], [21]   |
| 108. | <i>Tribulus terrestris</i> L.<br>(Zygophyllaceae)   | Leaves        | Juice   | [21]   |
| 109. | <i>Trichosanthes tricuspidata</i><br>D.Don.<br>(Cucurbitaceae)                            | Stem, roots   |   | [16]   |
| 110. | <i>Vitex peduncularis</i> Wall. Z<br>(Verbenaceae)  | Bark          | Juice   | [33]   |
| 111. | <i>Wattakaka volubilis</i> Staff. /<br><i>Dregea volubilis</i> Benth.<br>(Asclepiadaceae) | Root          | Juice   | [21]   |
| 112. | <i>Zanthoxylum acanthopodium</i><br>D.C. (Rutaceae)                                       | Fruit, leaves |   | [10], [15]   |
| 113. | <i>Zanthoxylum armatum</i> D. C.<br>(Rutaceae)  | Fruits        | Dried fruits are consumed directly              | [14], [26]   |
| 114. | <i>Zingiber gracile</i> Jack<br>(Zingiberaceae)   | Leaves        | Aromatic oil extracted from leaves taken orally | [31]   |
| 115. | <i>Zingiber officinale</i> Rosc.<br>(Zingiberaceae)                                       | Rhizome       |   | [7], [8], [13], [14], [16], [17], [18], [21], [25], [29], [31] |
| 116. | <i>Zizyphus mauritiana</i> Lamk.<br>(Rhamnaceae)  | Bark          |   | [21], [24]   |

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### 1.5 Mumps

The people suffering from mumps may sometimes experience no symptoms at all. However, sometimes they may experience swollen lymph nodes, difficulty

in swallowing etc. Below are the plants listed in Table 5 which are used to treat mumps.

Table 5: Medicinal plants used for the treatment of mumps

| Sl. No. | Name of the plant                                     | Part of the plant used | Forms of preparation             | Reference |
|---------|---|------------------------|----------------------------------|-----------|
| 1.      | <i>Aginata indica</i> L.<br>(Orobanchaceae)           | Rhizome                | Crushed juice applied externally | [31]      |
| 2.      | <i>Laportea crenulata</i> Roxb. Gaud.<br>(Urticaceae) | Roots                  | Decoction                        | [32]      |
| 3.      | <i>Mimosa pudica</i><br>(Fabaceae)                    | Whole plant            | Powder                           | [21]      |
| 4.      | <i>Sapindus mukorossi</i> Gaertn.<br>(Sapindaceae)    | Fruit                  | Juice                            | [21]      |
| 5.      | <i>Tagetes erecta</i> L.<br>(Asteraceae)              |                        |                                  | [44]      |

### 1.6 Pneumonia

Shallow breathing, sharp pain in chest, fever, etc. are few of the symptoms associated with pneumonia. The plants used to treat pneumonia are enlisted in Table 6.

Table 6: Medicinal plants used for the treatment of pneumonia

| Sl. No. | Name of the plant                             | Part of the plant used | Forms of preparation | Reference |
|---------|---|------------------------|----------------------|-----------|
| 1.      | <i>Achyranthes aspera</i> L. (Amaranthaceae)  |                        | Decoction            | [28]      |
| 2.      | <i>Acorus Calamus</i> L.<br>(Araceae)         | Leaves, rhizome        |                      | [41]      |
| 3.      | <i>Aegle marmelos</i> Corr.<br>(Rutaceae)     | Leaves                 |                      | [24]      |
| 4.      | <i>Ageratum conyzoides</i> Linn. (Asteraceae) | Leaves                 | Granules             | [21]      |
| 5.      | <i>Alstoia scholaris</i> (L)                  | Bark                   |                      | [41]      |

|     |   |                       |  |           |
|-----|---|-----------------------|--|-----------|
|     | R.<br>Br.<br>(Apocynaceae)  |                       |  |           |
| 6.  | <i>Caesalpinia bonducella</i> Flem.<br>(Caesalpinaceae)             | Seed, fruit           | Juice  | [8], [21] |
| 7.  | <i>Chrysophyllum roxburghii</i> G. Don<br>(Sapotaceae)              | Seed                  |  | [21]      |
| 8.  | <i>Cinnamomum glanduliferum</i><br>Meissn. (Lauraceae)              | Stem bark             | Juice  | [21]      |
| 9.  | <i>Cinnamomum glaucascens</i> (Nees)<br>Hand-Mezz.<br>(Lauraceae)   | Stem bark             | Juice  | [31]      |
| 10. | <i>Citrus limon</i> L. Burm.<br>(Rutaceae)                          | Leaves, seed,<br>bark | Paste of 3 seeds,<br>3 pieces of bark<br>and 3-5 leaves is<br>mixed with a<br>little water and<br>salt, heated and<br>given in empty<br>stomach; once<br>daily for 3 days. | [8]       |
| 11. | <i>Clerodendrum viscosum</i><br>Vent. (Verbenaceae)                 | Roots                 |  | [41]      |
| 12. | <i>Crinum asiaticum</i> L.<br>(Amaryllidaceae)                      | Bulb                  |  | [41]      |
| 13. | <i>Cyclosorus extensa</i><br>Naud.<br>(Thelypteridaceae)            | Fresh leaves          |  | [21]      |
| 14. | <i>Cymbopogon flexuosus</i><br>(Steud.) Wats<br>(Poaceae)           | Leaves                |  | [41]      |
| 15. | <i>Drymaria cordata</i> L.<br>Willd.ex Schult.<br>(Caryophyllaceae) | Whole plant           |  | [6]       |
| 16. | <i>Eucalyptus globulus</i><br>Labillardière<br>(Myrtaceae)          | Leaves                | Infusion   | [34]      |
| 17. | <i>Fragaria indica</i> Andr.<br>(Rosaceae)                          | Fresh leaves          |  | [21]      |

|     |  |                    |        |            |
|-----|--|--------------------|--------|------------|
| 18. | <i>Gaultheria<br/>fragrantissima</i> Wall.<br>(Eriaceae)                 | Leaf               | Juice  | [21]       |
| 19. | <i>Lantana Camara</i> L.<br>(Verbenaceae)                                | Leaves             |        | [41]       |
| 20. | <i>Leucas aspara</i><br>(Wild.)<br>Link. (Labiatae)                      | Leaves,<br>flowers |        | [41]       |
| 21. | <i>Mirabilis jalapa</i> L.<br>(Nyctaginaceae)                            | Rhizome,<br>leaves |        | [41]       |
| 22. | <i>Mucuna pruriens</i> DC.<br>(Fabaceae)                                 | Seeds              |        | [41]       |
| 23. | <i>Musa balbisiana</i> Coll.<br>(Musaceae)                               | Rhizome            |        | [41]       |
| 24. | <i>Musa superba</i> Roxb.<br>(Musaceae)                                  | Inflorescence      | Latex  | [21]       |
| 25. | <i>Nyctanthes arbor –<br/>tristis</i><br>L. (Oleaceae)                   | Leaves             |        | [41]       |
| 26. | <i>Oldenlandia<br/>corymbosa</i> Linn.<br>(Rubiaceae)                    | Bark and<br>leaves |        | [21]       |
| 27. | <i>Oroxylum Indicum</i><br>(L.) Vent.<br>(Bignoniaceae)                  | Bark               |        | [41]       |
| 28. | <i>Phlogacanthus<br/>thyrsiformis</i><br>(Hardw.) Mabb.<br>(Acanthaceae) | Flower             |        | [41]       |
| 29. | <i>Piper longum</i> L.<br>(Piperaceae)                                   | Leaves             |        | [41]       |
| 30. | <i>Polygonum<br/>caespitosum</i> Blume<br>Polygonaceae leaves            |                    |        |            |
| 31. | <i>Polygonum<br/>hydropiper</i> Linn.<br>(Polygonaceae)                  | Fresh leaves       |        | [21], [41] |
| 32. | <i>Polygonum plebeium</i><br>L. (Lamiaceae)                              | Whole plant        |        | [8]        |
| 33. | <i>Rorippa<br/>nasturtiumaguaticum</i><br>(L.) Hayak<br>(Brassicaceae)   | Whole plant        | Boiled | [23]       |
| 34. | <i>Solanum Indicum</i><br>Linn. (Solanaceae)                             | Fruits, leaves     |        | [41]       |



|     |  |                 |      |
|-----|--|-----------------|------|
| 35. | <i>Solanum torvum</i> Sw.<br>(Solanaceae)                | Roots           | [41] |
| 36. | <i>Stellaria media</i> L.<br>(Caryophyllaceae)           | Leaves          | [41] |
| 37. | <i>Stereospermum<br/>cheonoides</i> DC.<br>(Acanthaceae) | Young<br>leaves | [24] |
| 38. | <i>Thysanolaena<br/>maxima</i> (Poaceae)                 | Young<br>leaves | [24] |
| 39. | <i>Vitex peduncularis</i><br>Wall. (Verbenaceae)         | Young<br>leaves | [24] |
| 40. | <i>Xanthium strumarium</i><br>L. (Asteraceae)            | Seeds           | [41] |

### 1.7 Sore throat

Sore throat may not be caused by any certain disease at times. It may be caused due to overuse of voice, very dry mouth etc. The main difficulty faced by people suffering from sore throat is pain or a scratchy sensation. The plants utilized to get relief from sore throat are listed in Table 7.

Table 7: Medicinal plants used for the treatment of sore throat

| Sl. No. | Name of the plant                                      | Part of the plant used | Forms of preparation                   | Reference  |
|---------|--|------------------------|--|------------|
| 1.      | <i>Aeschynanthus maculata</i> Lindl.<br>(Gesneriaceae) | Flower                 | Juice                                  | [21]       |
| 2.      | <i>Allium sativum</i> L.<br>(Liliaceae)                | Cloves                 | Crushed and warmed with mustard oil    | [8], [21]  |
| 3.      | <i>Bischofia javanica</i><br>Bl. (Euphorbiaceae)       | Leaves                 | Juice                                  | [21]       |
| 4.      | <i>Cymbopogon flexuosus</i> (Poaceae)                  | Leaves                 |  | [41]       |
| 5.      | <i>Diospyros embryopteris</i> Pers.<br>(Ebenaceae)     | Fruit                  | Infusion                               | [21]       |
| 6.      | <i>Emblica officinalis</i><br>Gaertn. (Euphorbiaceae)  | Fruit                  | Dried fruits are soaked in mustard oil | [11], [21] |
| 7.      | <i>Morus alba</i> L.<br>(Moraceae)                     | Leaves                 | Juice                                  | [32]       |
| 8.      | <i>Oroxylum indicum</i>                                | Bark, leaf             | Mixed the                              | [9]        |

|     |  |         |   |   |
|-----|--|---------|---|---|
|     | (L.) Vent.<br>(Bignoniaceae)                           |         | bark with salt<br>(Meitei salt) +<br>tekta (lomba)<br>and boil it and<br>served as<br>decoction half<br>a glass twice a<br>day for a<br>week. |   |
| 9.  | <i>Pratia begonifolia</i><br>Lindl.<br>(Campanulaceae) | Fruit   |   | [21]  |
| 10. | <i>Sterculia villosa</i><br>Roxb. (Sterculiaceae)      | Bark    | Juice   | [21]  |
| 11. | <i>Terminalia bellerica</i><br>Roxb.<br>(Combretaceae) | Fruit   |   | [28]  |
| 12. | <i>Zingiber officinale</i><br>Rosc.<br>(Zingiberaceae) | Rhizome | Small piece of<br>rhizome is<br>mixed with<br>honey   | [7], [8], [13],<br>[14], [16], [17],<br>[18], [21], [25],<br>[29] |

### 1.8 Tonsillitis

It is caused due to the inflammation of the tissue at the back of the throat and is accompanied by pain in the ear or during swallowing. The plants used for the treatment of this disease are listed in Table 8. Generally, patients are diagnosed for tonsillitis, when they complain about difficulty in swallowing or throat pain. Traditional healers mostly do not differentiate among sore throat, pharyngitis and tonsillitis and give similar medications sometimes changing doses [33].

Table 8: Medicinal plants used for the treatment of tonsillitis

| Sl. No. | Name of the plant                            | Part of the plant used | Forms of preparation   | Reference |
|---------|--|------------------------|--|-----------|
| 1.      | <i>Abrus precatorius</i><br>L.<br>(Fabaceae) | Seeds                  | 3 seeds are<br>pounded with<br>a fruit of<br>Tokow, 3<br>tender shoots<br>of each of<br>Lotamahudi &<br>Zutulipoka &<br>boiled with 10 | [8], [43] |

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|     |   |                         |   |      |
|-----|---|-------------------------|---|------|
|     |   |                         | ml water and filtrate is given in tonsillitis, once daily for 3 days.           |      |
| 2.  | <i>Actephila excels</i><br>(Euphorbiaceae)                          | Leaves                  | Juice   | [21] |
| 3.  | <i>Bischofia javanica</i><br>Bl. (Euphorbiaceae)                    | Leaves                  | Juice   | [21] |
| 4.  | <i>Colocasia esculenta</i><br>(Araceae)                             | Corns, runners          |   | [11] |
| 5.  | <i>Crinum asiaticum</i><br>Linn.<br>(Amaryllidaceae)                | Bulbs                   | Bulb extract rubbed over area of tonsillitis after drying extract under the sun | [39] |
| 6.  | <i>Drymaria cordata</i><br>L. Willd.ex Schult.<br>(Caryophyllaceae) | Whole plant             |   | [6]  |
| 7.  | <i>Oroxylum indicum</i><br>(L.) Vent.<br>(Bignoniaceae)             | Leaves                  | Decoction   | [46] |
| 8.  | <i>Sapindus mukorossi</i><br>Gaertn.<br>(Sapindaceae)               | Fruits                  | Soaked in water and that water is used for gargling                             | [21] |
| 9.  | <i>Spondias mangifera</i><br>(Anacardiaceae)                        | Tender leaves and seeds |   | [12] |
| 10. | Lour. ( <i>Stemonaceae</i> )<br><i>Stemona tuberosa</i>             | Tuber                   | Decoction   | [31] |
| 11. | <i>Uncaria laevigata</i><br>Wall. (Rubiaceae)                       | Roots                   | Decoction   | [21] |
| 12. | <i>Vitex trifolia</i> L.f.<br>(Lamiaceae)                           | Leaves                  | Crushed extract of the leaves mixed with honey                                  | [5]  |

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### 1.9 Tuberculosis

Tuberculosis is a bacterial disease which affects the lungs. It spreads easily and most of the times, the people with this disease do not show any symptoms. Usually when the symptoms occur, they include cough accompanied with

blood, shortness of breath, pain in chest etc. The plants used for the treatment of this bacterial disease are enlisted in Table 9.

Table 9: Medicinal plants used for the treatment of tuberculosis

| Sl. No. | Name of the plant                                     | Part of the plant used | Forms of preparation  | Reference        |
|---------|---|------------------------|---|------------------|
| 1.      | <i>Adhatoda vasica</i> Nees. (Acanthaceae)            | Leaves                 | Juice of the leaves is mixed with juice of the leaves of <i>Mikania micrantha</i> H.B.K. (Asteraceae) along with Shilajit | [21], [33]       |
| 2.      | <i>Eulophia nuda</i> Lindl. (Orchidaceae)             | Tuber                  | Juice   | [21]             |
| 3.      | <i>Gynura conyza</i> Cass. (Asteraceae)               | Leaves                 | Decoction   | [21], [33]       |
| 4.      | <i>Plantago major</i> L. (Plantaginaceae)             | Root, stem, leaves     | Decoction   | [21], [32], [33] |
| 5.      | <i>Rothea serrate</i> L. Steane & Mabb. (Verbenaceae) | Leaves, stem, leaves   | Decoction   | [32]             |
| 6.      | <i>Terminalia chebula</i> Retz. (Combretaceae)        | Fresh bark             | Fresh bark is crushed with the seeds of <i>Piper nigrum</i> Linn. and taken orally  | [21]             |

Diseases of the respiratory system are not rare among the people of northeast India. The diverse flora of the region has allowed its inhabitants to utilize a large number of plants for the treatment of numerous respiratory ailments. From the above tables, it is clear that there are several plants found in northeast India that can be utilized for the treatment of different respiratory diseases.

But at the same time, since there are no laboratory tests performed, it cannot be said for sure that the diseases are in fact the ones claimed by the locals that are treated by the traditional plants. There should be more researches and experiments

conducted so that the proper knowledge of the chemical constituents of the plants are known and are accordingly utilized.

Nevertheless, the following points can be gathered from the tabulated information:

- i. It can be seen that the plant *Zingiber officinale* belonging to the family of Zingiberaceae, the rhizome to be specific is used to a greater extent for the treatment of the respiratory ailments as compared to the other plants available in the region.
- ii. The plants belonging to the *Ocimum* and *Adhatoda* genera are seen to have a greater number of uses for the treatment of various respiratory ailments.
- iii. The most commonly used form of preparation of the plants is decoction.
- iv. The part of the plant that is utilized largely is the leaf.
- v. One of the common diseases of the respiratory system that the people here suffer from is cough and so a greater number of plants have been utilized in various forms (decoction, infusion, maceration, etc.) for the treatment of cough.

The use of these plants in place of conventional drugs may have a greater number of advantages as they also align with the ideologies of the personal health of the individuals living in a particular region. Sure enough, much deeper and extensive study and research with a proper scientific understanding has to be done in these areas as there might be a scope of discovering newer plants with important medicinal properties. These plants may prove to be alternatives for the drugs that are used today as drugs lead to serious adverse drug reactions including drug abuse or dependency. Also, the discovery of newer plants can be utilized by people of other regions and accordingly help in the treatment or prevention of respiratory diseases. The discovery of new plants would help to understand nature and also such studies would help to identify endangered or extinct species of medicinally important unnoticed plants.

### **Conclusion**

From this study, it is revealed that there are various traditional plants in northeast India which have great significance when it comes to the treatment of the respiratory disorder. These plants are better alternatives as they have lesser side effects as well as greater efficacy as compared to synthetically produced medicines. This review may serve as a base for any kind of scientific study which would involve a proper and extensive study for the exploitation of these plants for the treatment of respiratory ailments as well as other disorders of the body. It also creates awareness about proper cultivation and conservation of such plants to ensure sustainable usage. At the same time, it will also provide assistance to researchers who conduct phytochemical studies which would, in turn, promote the

importance of these plants among the population before they get destroyed by urbanization, road development, and calamities like landslides, earthquakes etc. and traditional practices like shifting cultivation.

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