

**CROTON TIGLIUM LINN. (JAYPAL/JAMALGOTA): A  
COMPREHENSIVE REVIEW**

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**ABSTRACT**

*Croton tiglium* Linn. (*Jaypal/Jamalgota*), a member of the *Euphorbiaceae* family, is an important medicinal plant described in *Ayurveda* with significant therapeutic as well as toxicological properties. In *Agada Tantra*, it is classified under *Sthavara Visha* and *Upavisha* due to its potent toxic effects. Traditionally, the seeds and seed oil of *Jaypal* have been used as strong purgatives and in the management of constipation, ascites, intestinal worms, skin disorders, and various abdominal diseases after proper *Shodhana* (purification). Classical *Ayurvedic* texts emphasize the necessity of purification and appropriate dosage to ensure safe therapeutic use. Modern phytochemical studies have identified phorbol esters, tiglane diterpenoids, -sitosterol, and other bioactive compounds responsible for its pharmacological activities. Experimental studies have demonstrated antioxidant, antimicrobial, antifungal, antiviral, antitumor, antileukemic, and

gastrointestinal effects. However, improper use or overdose may produce severe toxic manifestations such as gastrointestinal irritation, vomiting, diarrhea, dehydration, blister formation, and electrolyte imbalance. The present review highlights the *Ayurvedic* and modern perspectives of *Croton tiglium*, including its nomenclature, pharmacological properties, traditional uses, toxicological profile, *Shodhana* procedures, therapeutic

applications, antidotal measures, and medico-legal importance. Understanding both the medicinal and toxic aspects of *Jaypal* is essential for its safe and effective utilization in *Ayurvedic* practice and toxicological management.

- **KEYWORDS:** *Croton tiglium*, *Jaypal*, *Jamalgota*, *Agada Tantra*, *Upavisha*, *Shodhana*, Toxicology, *Ayurvedic* Pharmacology.

## INTRODUCTION

*Ayurveda* is a holistic system of medicine that promotes healthy living through the balance of physical, mental, and spiritual well-being. It includes various specialized branches, among which *Agada Tantra* is concerned with toxicology, poisons, and their treatment. This branch not only studies poisonous substances and their harmful effects but also explains how certain toxic plants and minerals can be used therapeutically after proper purification and processing. Many medicinal plants described in *Ayurveda* possess both healing and poisonous properties, making their correct identification and usage extremely important.

One such important medicinal plant is *Croton tiglium* Linn., commonly known as *Jaypal* or *Jamalgota*. It belongs to the family *Euphorbiaceae* and is recognized for its strong purgative and medicinal properties. In *Ayurvedic* literature, *Jaypal* is used in the management of conditions such as constipation, abdominal disorders, edema, skin diseases, and other ailments after undergoing proper *Shodhana* (purification). The seeds and oil of the plant are considered highly potent and effective in therapeutic applications. At the same time, the plant is also known for its toxic nature, as excessive or improper use can lead to severe irritation, vomiting, diarrhea, dehydration, and other toxic manifestations.

Due to its potent medicinal as well as toxic properties, *Croton tiglium* occupies a unique position in *Agada Tantra*. Proper knowledge regarding its purification, dosage, therapeutic applications, and toxic manifestations is essential for its safe and effective use. Therefore, this review attempts to highlight the *Ayurvedic* perspective of *Jaypal* (*Jamalgota*), focusing on its pharmacological importance, therapeutic uses, toxic effects, and role in the management of poisoning and detoxification practices.

• **Image 1:** *Dantibeej* Plant (*croton tiglium*)



**Vernacular Names<sup>[1]</sup>**

| Language         | Synonyms                        |
|------------------|---------------------------------|
| <b>Hindi</b>     | <i>Jamalgota</i>                |
| <b>English</b>   | Purging croton, Croton oil seed |
| <b>Telugu</b>    | <i>Nepalamu, Nepalavemu</i>     |
| <b>Tamil</b>     | <i>Kattukkattai, Nervalam</i>   |
| <b>Bengali</b>   | <i>Joypal</i>                   |
| <b>Kannada</b>   | <i>Japala, Nepala</i>           |
| <b>Gujarati</b>  | <i>Jamalgota, Jaypal</i>        |
| <b>Marathi</b>   | <i>Jaypal, Jamalgota</i>        |
| <b>Malayalam</b> | <i>Katalavanakku, Nirvalam</i>  |

**Other Synonyms<sup>[2]</sup>**

1. *Saraka*
2. *Recaka*
3. *Dantibijam*
4. *Vijarecini*
5. *Kuntini-vijam*
6. *Vijantakhyam*

7. *Cakradanti-vija*
8. *Jaypala*
9. *Tittiri-phala*
10. *Maladravi*
11. *Kumbhi-vijam*
12. *Ghanta-vija*
13. *Shodhini*
14. *Nikumbhi-vija*
15. *Jaypal*
16. *Dravanti*
17. *Mukul*
18. *Tintidi-phal*

### Phytochemical & Botanical Features

#### Active Principles<sup>[3]</sup>

1. Crotin
2. Crotonicide
3. Fixed oil
4. Resins and phorbol esters

#### Classical Categorization<sup>[4]</sup>

- **Caraka:** Not included in *varga*
- **Suśruta:** Not included in *gana*
- **Vāgbhaṭa:** *Guducyadi varga*

#### Botanical Features<sup>[5],[6]</sup>

- *Croton tiglium* is an evergreen shrub or small tree distributed, about 2–7 m in height; young green branches, covered with sparse stellate leaves, which ovate or oblong ovate, and the tips of leaves are acuminate, 5–13 cm long, 2.5–6 cm wide, palmately three veined, both sides covered with sparse stellate hairs, petiole 2–6 cm long; flowers small, monoecious; terminal raceme, 8–14 cm long, female flowers on the bottom, male flowers on the top. Capsules are rectangular, 2 cm long, 1–1.5 cm wide; seeds are long oval, the cut surfaces are triangular.

### Part Used & Cultivation

- *Croton tiglium* is propagated by seeds, sowed directly or transplanted. The live broadcast is generally harvested from August to September to reserve seeds. In a high-temperature area, the seeds are harvested and sown at the same time; in low-temperature area, the seeds are sown in February of next year. *Croton tiglium* can bear fruit only after 5–6 years of planting, and the seeds will mature from August to November. They can be harvested in batches, removed the residual branches and leaves, dried in the sun for 2–3 days *Pañcāṅga* (Whole plant).
- **Parts used:** Seed, seed oil.

### Explanation of Useful Part (Seed)

- **Shape and size:** Seeds are ovoid to oblong, slightly quadrangular in shape. They are approximately 12 mm long and resemble castor (*Ricinus communis*) seeds in appearance.
- **External features:** Seeds are albuminous, dorsally convex, and somewhat flattened on the surface. The seed coat is hard, smooth, and brownish in colour. Seeds are compact and characteristic in appearance.
- **Internal features:** Seeds are albuminous, dorsally convex, and somewhat flattened on the surface. The seed coat is hard, smooth, and brownish in colour. Seeds are compact and characteristic in appearance.
- **Fracture:** Hard, short, and oily on breaking.
- **Odour:** Slight characteristic odour; more noticeable when crushed.
- **Taste:** Acrid, pungent, and irritating in taste.

### Distribution<sup>[7]</sup>

- *Croton tiglium* is cultivated in Southwest, South, Southeast and East China. The main producing area of *C. tiglium* was recorded in Meizhou in the Newly Revised Materia Medica.

### Major Chemical Constituents<sup>[8]</sup>

- **Seeds:** - Sitosterol
- **Seed oil:** Phorbol-12-tiglate-13-decanoate (1), Tiglyol
- **Leaves:** tigliane diterpenoids

**Ayurvedic Properties of Jaypal<sup>[4]</sup>**

| Property           | Description                                                                                                         |
|--------------------|---------------------------------------------------------------------------------------------------------------------|
| <b>Rasa</b>        | <i>Katu</i>                                                                                                         |
| <b>Guna</b>        | <i>Guru, Ruksha, Tikshna</i>                                                                                        |
| <b>Veerya</b>      | <i>Ushna</i>                                                                                                        |
| <b>Vipaka</b>      | <i>Katu</i>                                                                                                         |
| <b>Doshaghnata</b> | <i>Kapha pitta samaka. Pittasāmaka as it is Recaka. Kaphahara because of Usna virya, Kaṣu vipāka and Katu rasa.</i> |
| <b>Karma</b>       | <i>Virecaka, Lekhana, Vidāhi, Sphotajanana, Krimghna, Visaghna, Jalodaranaśaka and Kasahara.</i>                    |
| <b>Rogaghnata</b>  | <i>Vibandha, Krimi, Viṣavikāra, Jaṭara roga, Kāsa and Jalodara.</i>                                                 |

**Traditional & Therapeutic Uses<sup>[8][10]</sup>**

The genus *Croton* comprises several medicinally important species, including *Croton tiglium* and *Croton crassifolius*, which have long been utilized in Traditional Chinese Medicine (TCM) for the management of gastrointestinal disorders, intestinal inflammation, rheumatic conditions, peptic ulcers, and visceral pain. Among these species, the seeds of *C. tiglium*, commonly known as "Badou" in China, are recognized as the primary medicinal component. Phytochemical investigations have identified tiglane-type diterpenoids as the major bioactive constituents responsible for many of the plant's pharmacological activities.

The medicinal use of *C. tiglium* in China dates back more than two millennia. Its earliest documentation appears in Shennong's Classic of Materia Medica, where Croton oil was described as the principal medicinal preparation. However, Croton oil is also regarded as the primary toxic constituent due to its potent purgative properties. To reduce toxicity while preserving therapeutic efficacy, various traditional processing techniques were developed, including deoiling, boiling, simmering, and milk processing. According to the Chinese Pharmacopoeia, processed *C. tiglium* seeds, known as Croton cream (*Crotonis Semen Pulveratum*), should contain 18–20% oil.

Traditionally processed Croton cream has been used to alleviate intestinal inflammation and control diarrhoea. Historical records, particularly the Compendium of Materia Medica, also describe the medicinal applications of other plant parts. The seed shells were employed to relieve stagnation and diarrhoea, the roots were used for ulcerative and dermatological disorders, and Croton oil was prescribed for conditions such as stroke, apoplexy, phlegm accumulation, throat obstruction, and trismus. Furthermore, *Crotonis Fructus* has been widely used for the treatment of gastrointestinal ailments, including constipation, abdominal pain, peptic ulcers, and intestinal inflammation. Topical formulations containing *Crotonis Fructus*

and turmeric rhizome extracts have additionally been reported for the management of androgenic alopecia.

In the classical medical text Treatise on Febrile and Miscellaneous Diseases, *C. tiglium* is included in several renowned prescriptions, including San Wu Bai San, Zou Ma Tang, Jiu Tong Wan, and San Wu Bei Ji Wan, which were traditionally used for conditions associated with chest obstruction and pulmonary abscesses. Contemporary studies have suggested that formulations such as San Wu Bai San may improve the quality of life and prolong survival in patients with gastric cancer. Owing to its diverse pharmacological properties and extensive therapeutic applications, *C. tiglium* remains an important medicinal plant and is incorporated into numerous traditional formulations documented in the Chinese Pharmacopoeia and other official TCM references.

### Common Formulations<sup>[9]</sup>

| Formulation Name        | Therapeutic Indication / Use |
|-------------------------|------------------------------|
| <i>Ichhabhedi Rasa</i>  | <i>Virecanaartha</i>         |
| <i>Udarāri Rasa</i>     | <i>Jalodara</i>              |
| <i>Rāmabāna Rasa</i>    | <i>Jwara</i>                 |
| <i>Mahānnārācī Rasa</i> | As a <i>virechana dravya</i> |

### Shodhana, Dosage, & Modern Pharmacology

#### Shodhana (Purification)<sup>[11]</sup>

The rind of the seeds is removed and then boiled in cow's milk for 1.2 hours. The seeds are then washed with hot water and triturated with lemon juice. Lastly, they are dried in sunshine and preserved for use.

- **Part used<sup>[11]</sup>:** Seed, seed oil
- **Medicinal dose<sup>[11]</sup>:** Seeds- 30 to 60 mg; oil- 0.5 to 1 drop.

#### Medicinal Use<sup>[11]</sup>

1. **External uses:** It is an irritant on local application and has a scraping action. It is useful in skin diseases and hairfall (seeds are used). It is also used for local application on the penis in disorders of erection.
2. **Internal uses:** It is an appetizer, purgative and anthelmintic. It irritates the gastric mucosa causes reduce the water content of the blood in many conditions. It is also used in reduced appetite, chronic constipation, intestinal worms, ascites, intracranial haemorrhage and anasarca. Seeds triturated in lemon juice are used as eye drops in snake poisoning.

**Biological & Cytotoxic Activity**<sup>[12][13][14][15]</sup>

- **Cytotoxic Activity:** Wang et al. isolated five new phorbol esters and four known phorbol ester analogues from the branches and leaves of *Croton tiglium* Linn. Structural elucidation was carried out using extensive NMR and mass spectrometric analyses. The isolated compounds exhibited potent cytotoxic activity, while some also showed selective anti-inflammatory effects, suggesting their potential therapeutic significance.
- **Antioxidant Activity:** Studies have demonstrated that *Croton tiglium* possesses significant antioxidant potential. Investigations on different plant parts revealed that leaf extracts exhibit higher peroxidase enzyme activity and enhanced antioxidant properties. Variations in enzymatic and antioxidant activities were observed among different plant extracts, indicating the presence of biologically active phytoconstituents capable of reducing oxidative stress.
- **Antitumor Activity:** Several studies have reported the antitumor potential of *Croton tiglium*. Various compounds isolated from the seeds, leaves, and twigs exhibited cytotoxic effects against different cancer cell lines, particularly hepatic tumor and leukemia cell lines. Tiglane diterpenoids and phorbol ester derivatives demonstrated notable inhibitory activity against tumor cells. Traditional formulations containing *Croton tiglium*, such as *Siddha* preparations, have also been investigated for their anticancer properties. Experimental studies further suggested that certain isolated constituents suppress tumor growth in animal models. In addition, investigations involving nasopharyngeal carcinoma and Epstein–Barr virus-associated cell lines indicated promising antitumor effects of extracts and oil derived from the plant.
- **Anti-HIV Activity:** Extracts of *Croton tiglium* have shown inhibitory effects against Human Immunodeficiency Virus type-1 (HIV-1). Certain phorbol ester derivatives isolated from the plant demonstrated antiviral activity by suppressing the cytopathic effects of the virus. Some compounds exhibited potent anti-HIV activity with comparatively low cytotoxicity and were reported to act independently of protein kinase C activation.
- **Antidermatophytic Activity:** The stem, leaf, and seed extracts of *Croton tiglium* have been evaluated against dermatophytic fungi, particularly *Trichophyton mentagrophytes*. Ethanolic stem extracts showed strong antifungal activity. Fatty acids such as oleic acid and hexadecanoic acid were identified as major constituents contributing to the antidermatophytic effect.

- **Antimicrobial Activity:** Purified proteins and extracts obtained from *Croton tiglium* have demonstrated broad-spectrum antimicrobial activity. Experimental findings revealed both antibacterial and antifungal effects, suggesting the potential application of the plant as a natural antimicrobial agent.
- **Antileukemic Activity:** Research conducted on animal models demonstrated that constituents isolated from Croton oil possess antileukemic properties. Certain phorbol ester derivatives were identified as active principles responsible for inhibitory effects against lymphatic leukemia.
- **Anticonvulsant Activity:** Hydroalcoholic seed extracts of *Croton tiglium* have been investigated for anticonvulsant activity in experimental animals. Although seizure protection was observed, the efficacy was lower than that of standard anticonvulsant drugs. Higher mortality rates were also reported in treated groups, indicating potential toxicity concerns.
- **Tumor-Promoting Activity:** Despite its medicinal potential, *Croton tiglium* is also recognized for its tumor-promoting properties, primarily due to the presence of phorbol esters. Experimental studies have shown that these compounds can alter cellular communication, membrane permeability, and other biological processes associated with tumor promotion. Investigations have also demonstrated mutagenic activity and the ability to enhance carcinogenic responses under certain conditions.
- **Gastrointestinal Activity:** *Croton tiglium* is well known for its pronounced effects on the gastrointestinal tract. Studies have demonstrated its influence on intestinal motility, smooth muscle contraction, and laxative activity. Both stimulant and relaxant actions on intestinal muscles have been reported, suggesting a dual mechanism of action involving calcium channels and muscarinic receptors. Processed seeds were found to be less toxic than raw seeds while retaining therapeutic activity. Additionally, extracts affected intestinal ion transport and epithelial cell proliferation, indicating a broader role in gastrointestinal physiology.

### Toxicological Profile & Management

#### Type of Poison<sup>[3]</sup>

- **Ayurveda:** *Sthavara Vanaspatik Visha, Upavisha Visha*
- **Modern:** Irritant Vegetative Poison

**Lethal Parameters & Harmful Effects**<sup>[3][9]</sup>

- **Fatal Dose**
  - In adults: 4–5 crushed seeds or 20 drops of oil
  - In children: 1–2 seeds or 2–3 drops of oil
- **Fatal Period:** 6–12 hours or variable
- **Harmful effects:** Blisters formation on external contact, gastrointestinal irritation, burning pain in abdomen, vomiting.

**Treatment & Antidotes**<sup>[22][12]</sup>

- **Modern Treatment:** Treatment must therefore be based on general principles. The stomach should be washed out with warm water and demulcents and stimulants administered. Dehydration and disturbances of electrolytes should receive adequate attention. Intravenous administration of glucose and saline is helpful. The universal antidote is of value in soothing the stomach and bowel.
- **Ayurvedic Antidote:** Drugs of *madhur rasa* and *sheeta veerya* like milk, cow's ghee, butter milk.

**Post-Mortem Appearance**<sup>[21]</sup>

- **External:** Not specific
- **Internal:** Post-mortem examination in *Croton tiglium* poisoning commonly reveals marked congestion of the gastrointestinal tract and kidneys. The gastric and intestinal mucosa may exhibit hyperemia, edema, and occasional hemorrhagic changes due to the irritant action of the toxin. Renal congestion is frequently observed, indicating systemic toxic involvement. These findings are consistent with the severe inflammatory and toxic effects produced by *Croton tiglium*.

**Medico-Legal Aspects**<sup>[16][17]</sup>

1. **Accidental:** Most of the cases are accidental in nature arising out of therapeutic misuse or mistaken ingestion of seeds, especially by children.
2. **Suicidal:** Rare.
3. **Homicidal:** Rarely It has been administered in food with homicidal intent. The wild tribes have used the soft parts of *croton tiglium* as an arrow poison.

## DISCUSSION AND CONCLUSION

### Discussion

*Croton tiglium* Linn. (*Jaypal/Jamalgota*) is a medicinal plant of considerable importance in Ayurved particularly in the branch of *Agada Tantra*, which deals with toxicology and the management of poisonous substances. Classical *Ayurvedic* texts describe Jaypal as a potent *Virechaka* (purgative) drug possessing *Katu rasa*, *Guru-Ruksha-Tikshna guna*, *Ushna virya*, and *Katu vipaka*. These properties make it useful in conditions such as chronic constipation, ascites (*Jalodara*), intestinal worm infestations, skin disorders, and other *Kapha*-dominant diseases.

Despite its therapeutic efficacy, *Jaypal* is categorized as a *Sthavara Visha* and *Upavisha* because of its strong toxic potential. The seeds and seed oil contain biologically active compounds, particularly phorbol esters and tiglane diterpenoids, which are responsible for both therapeutic and toxic effects. Modern scientific investigations have validated many of its traditional uses by demonstrating antioxidant, antimicrobial, antifungal, antiviral, antitumor, and gastrointestinal activities. These findings support the traditional *Ayurvedic* understanding of the plant as a powerful medicinal agent when used appropriately.

The review also highlights the significance of *Shodhana* (purification) procedures described in *Ayurveda*. The processing of seeds through milk boiling and other purification methods reduces toxicity while preserving therapeutic efficacy. This concept is further supported by modern studies indicating that processed seeds exhibit lower toxicity compared to raw seeds. Such observations emphasize the scientific relevance of *Ayurvedic* pharmaceutical practices.

However, the toxic manifestations associated with *Croton tiglium* cannot be overlooked. Ingestion of excessive quantities may result in severe gastrointestinal irritation, vomiting, profuse diarrhea, dehydration, electrolyte imbalance, and even death in severe cases. Experimental studies have also reported tumor-promoting and mutagenic properties of certain phorbol ester constituents. Therefore, strict adherence to proper dosage, purification procedures, and clinical supervision is essential for safe administration.

The medico-legal importance of *Jaypal* is also noteworthy. Although poisoning is most commonly accidental, cases related to therapeutic misuse, mistaken ingestion, and occasional criminal use have been reported. Hence, knowledge of its toxicological profile, post-mortem findings, and treatment protocols is important for both clinicians and forensic experts.

## CONCLUSION

*Croton tiglium* Linn. (*Jaypal/Jamalgota*) is a potent medicinal plant that possesses both therapeutic and toxic properties. Ayurvedic literature recognizes its value as a powerful purgative and therapeutic drug while simultaneously emphasizing the necessity of purification and controlled dosage because of its poisonous nature. Modern phytochemical and pharmacological studies have confirmed the presence of several bioactive compounds responsible for diverse biological activities, including antioxidant, antimicrobial, antiviral, antitumor, and gastrointestinal effects.

The dual nature of *Jaypal* highlights the importance of understanding both its medicinal benefits and toxicological risks. Traditional *Ayurvedic Shodhana* procedures play a crucial role in minimizing toxicity and enhancing safety, demonstrating the practical wisdom of classical *Ayurvedic* pharmaceuticals. Proper identification, purification, dosage regulation, and professional supervision are essential for its safe therapeutic use.

Further experimental and clinical research is required to validate its traditional indications, establish standardized safety parameters, and explore its potential applications in modern medicine. A comprehensive understanding of *Croton tiglium* from both *Ayurvedic* and contemporary scientific perspectives will contribute to its rational, effective, and safe utilization in healthcare practice.

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