

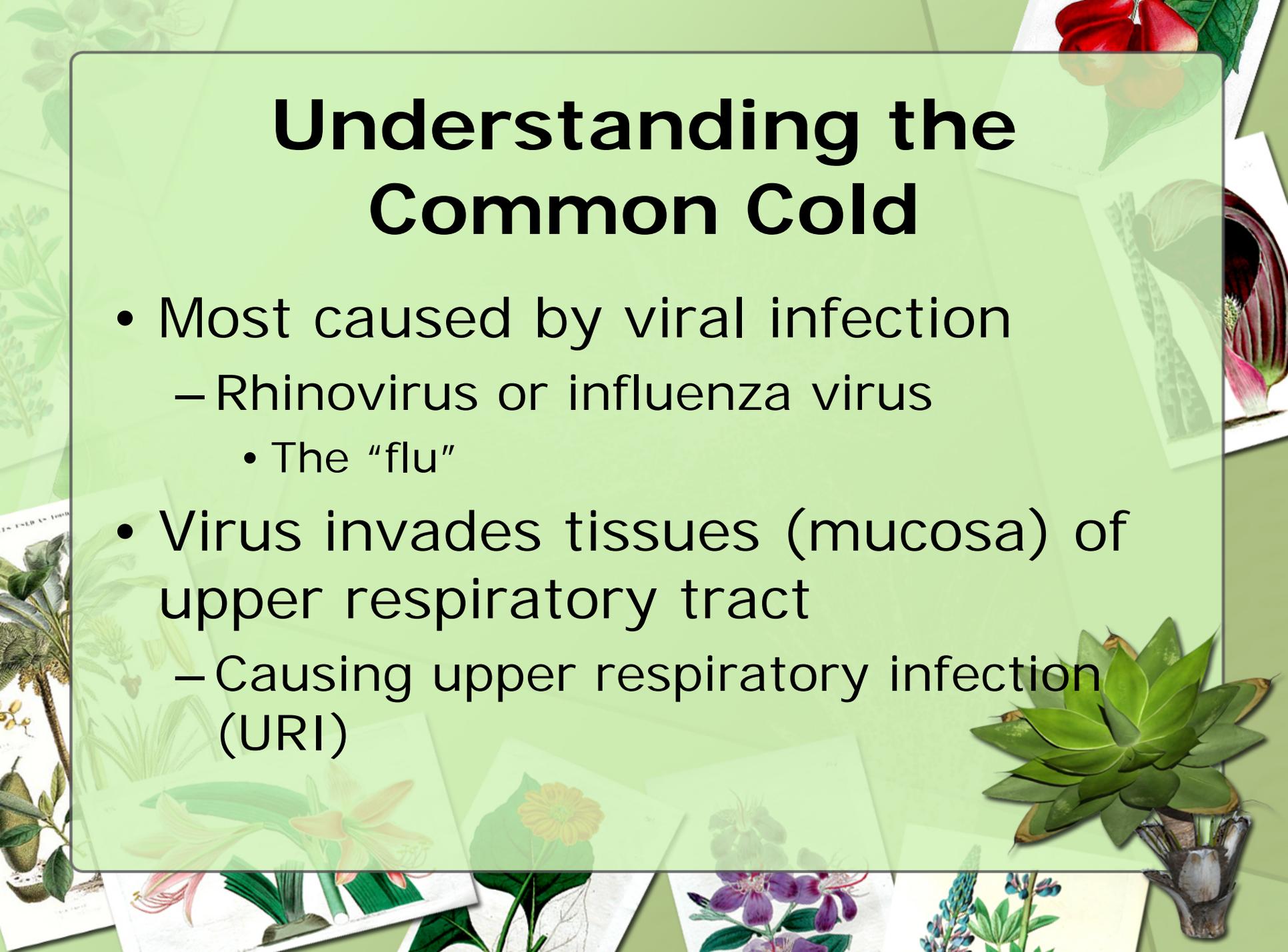
# Drugs Affecting the Respiratory System

**Antihistamines,  
Decongestants,  
Antitussives,  
and  
Expectorants**



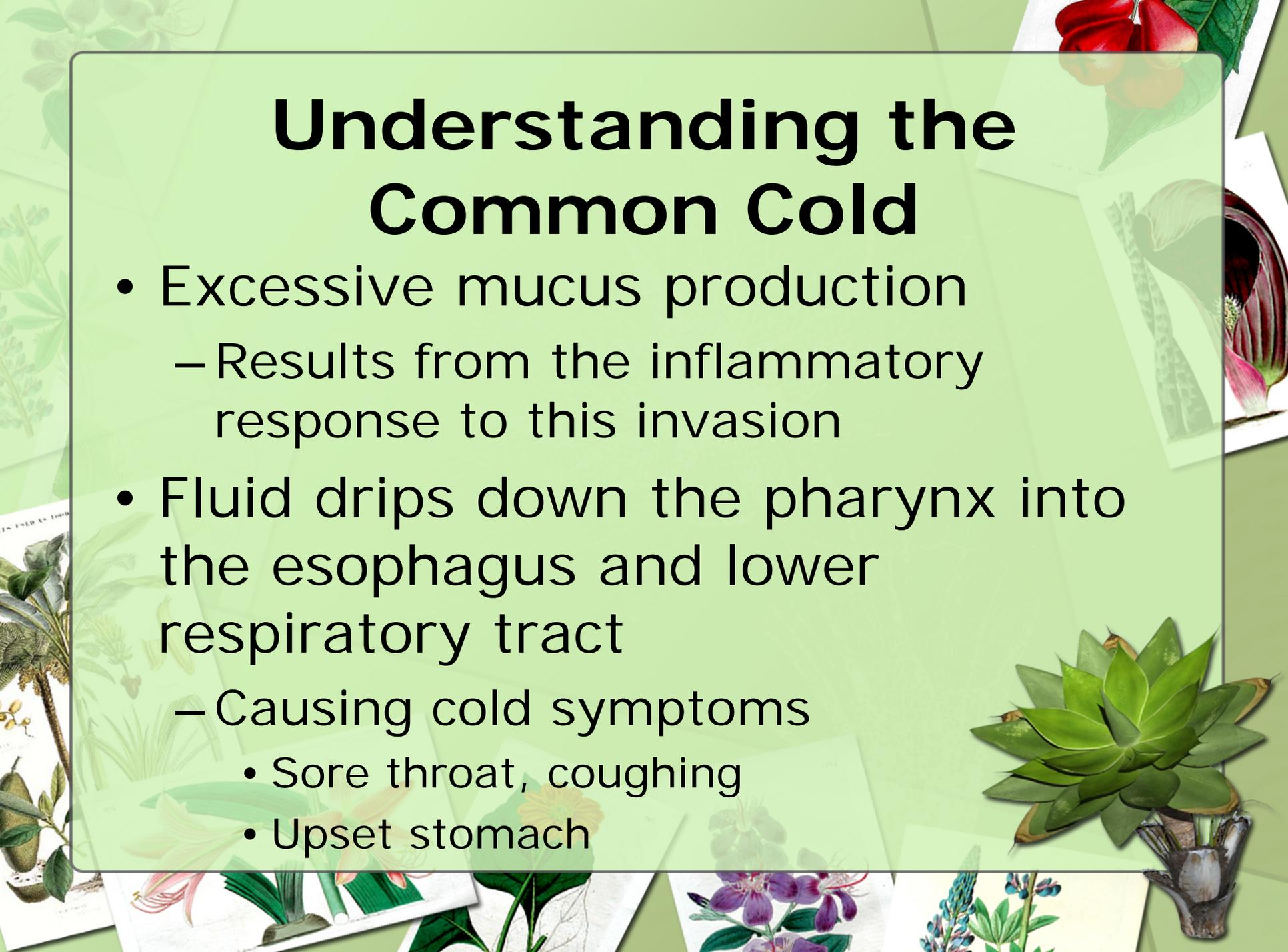
# Understanding the Common Cold

- Most caused by viral infection
  - Rhinovirus or influenza virus
    - The “flu”
- Virus invades tissues (mucosa) of upper respiratory tract
  - Causing upper respiratory infection (URI)



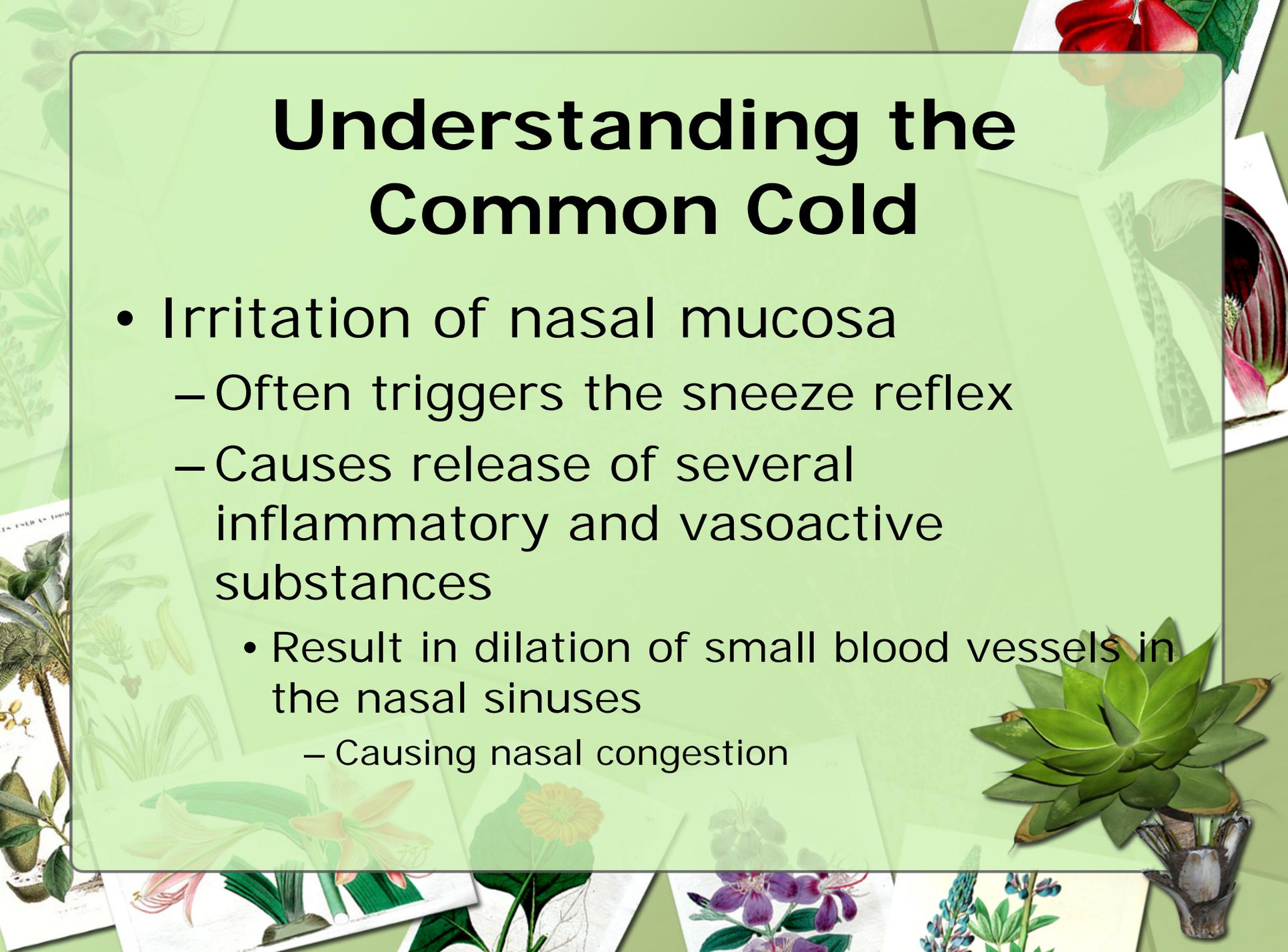
# Understanding the Common Cold

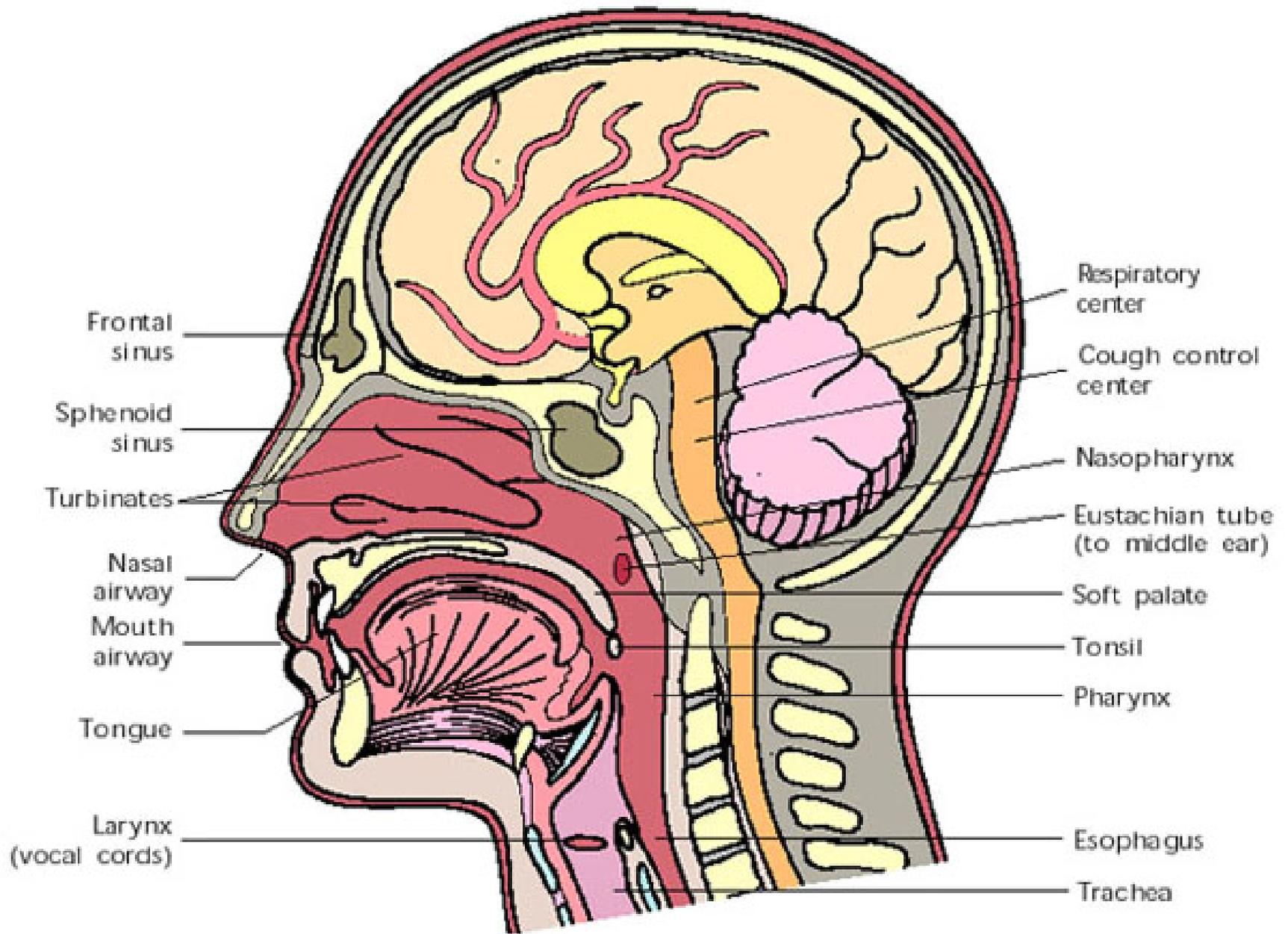
- Excessive mucus production
  - Results from the inflammatory response to this invasion
- Fluid drips down the pharynx into the esophagus and lower respiratory tract
  - Causing cold symptoms
    - Sore throat, coughing
    - Upset stomach



# Understanding the Common Cold

- Irritation of nasal mucosa
  - Often triggers the sneeze reflex
  - Causes release of several inflammatory and vasoactive substances
    - Result in dilation of small blood vessels in the nasal sinuses
      - Causing nasal congestion





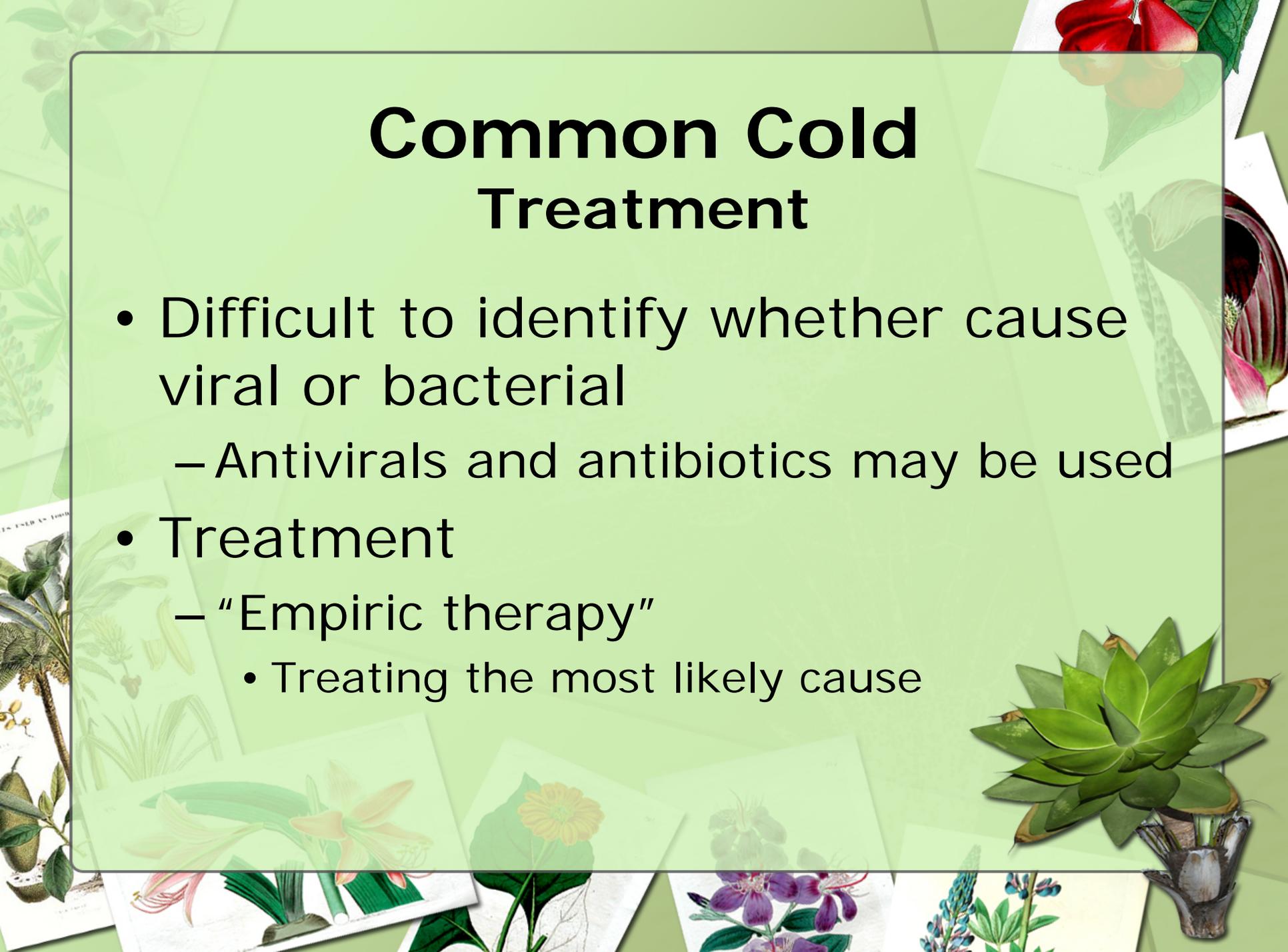
# Common Cold Treatment

- Involves combined use
  - Antihistamines
  - Nasal decongestants
  - Antitussives
  - Expectorants
- Treatment is SYMPTOMATIC
  - Not curative.
  - Does not eliminate the causative pathogen.



# Common Cold Treatment

- Difficult to identify whether cause viral or bacterial
  - Antivirals and antibiotics may be used
- Treatment
  - “Empiric therapy”
    - Treating the most likely cause

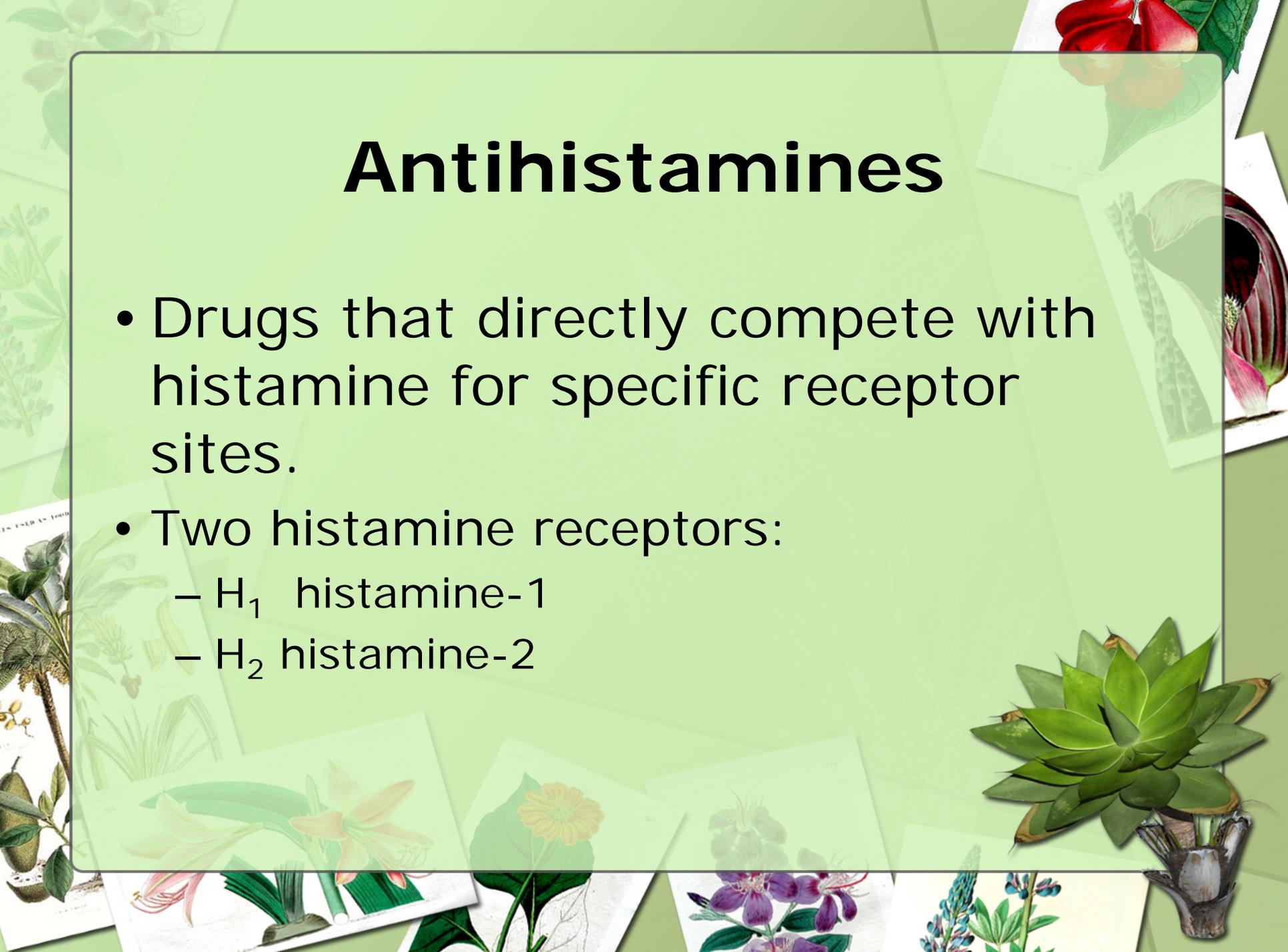


# Antihistamines



# Antihistamines

- Drugs that directly compete with histamine for specific receptor sites.
- Two histamine receptors:
  - H<sub>1</sub> histamine-1
  - H<sub>2</sub> histamine-2



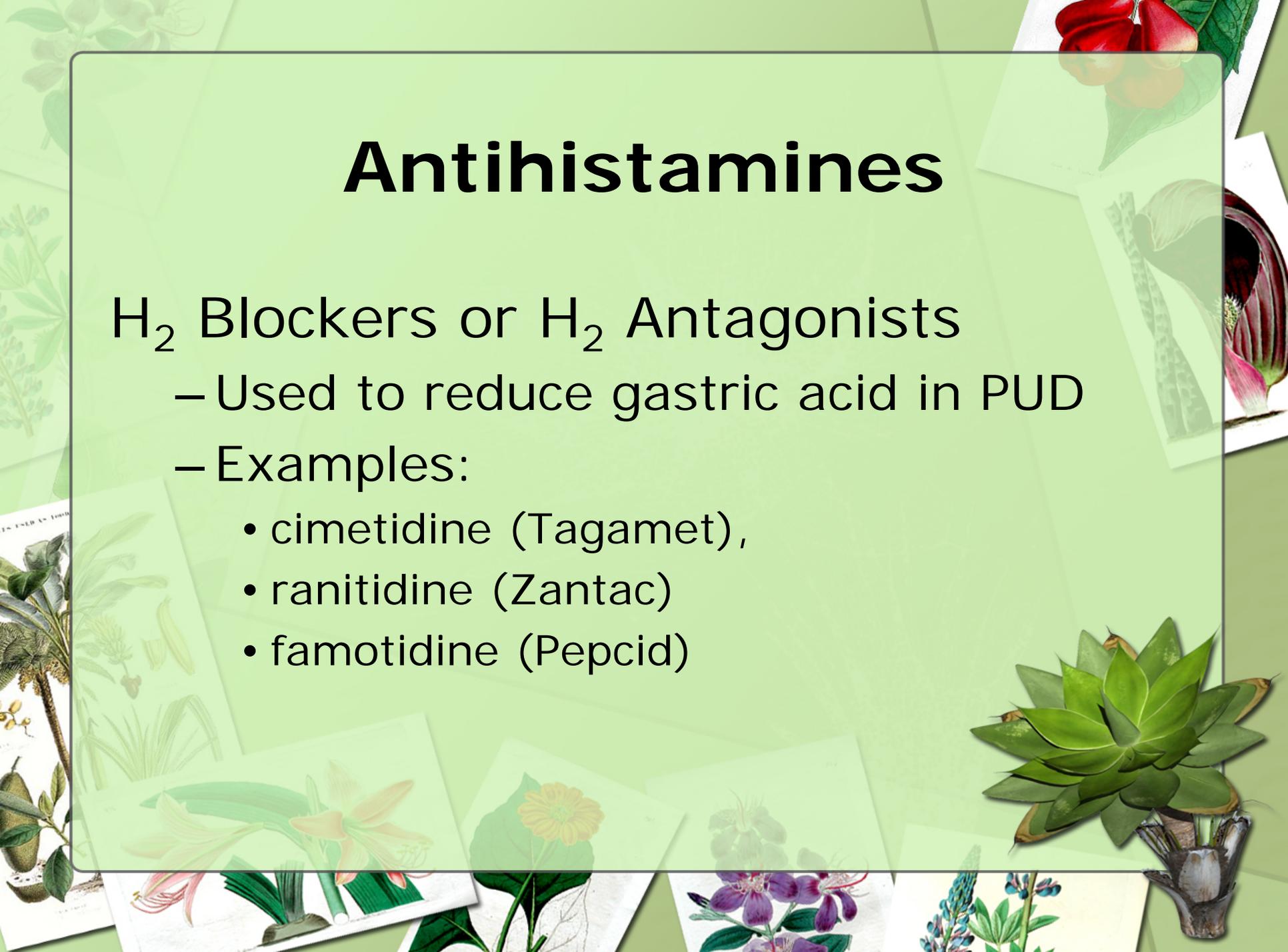
# Antihistamines

## H<sub>2</sub> Blockers or H<sub>2</sub> Antagonists

– Used to reduce gastric acid in PUD

– Examples:

- cimetidine (Tagamet),
- ranitidine (Zantac)
- famotidine (Pepcid)



# Antihistamines

H<sub>1</sub> antagonists are commonly referred to as antihistamines

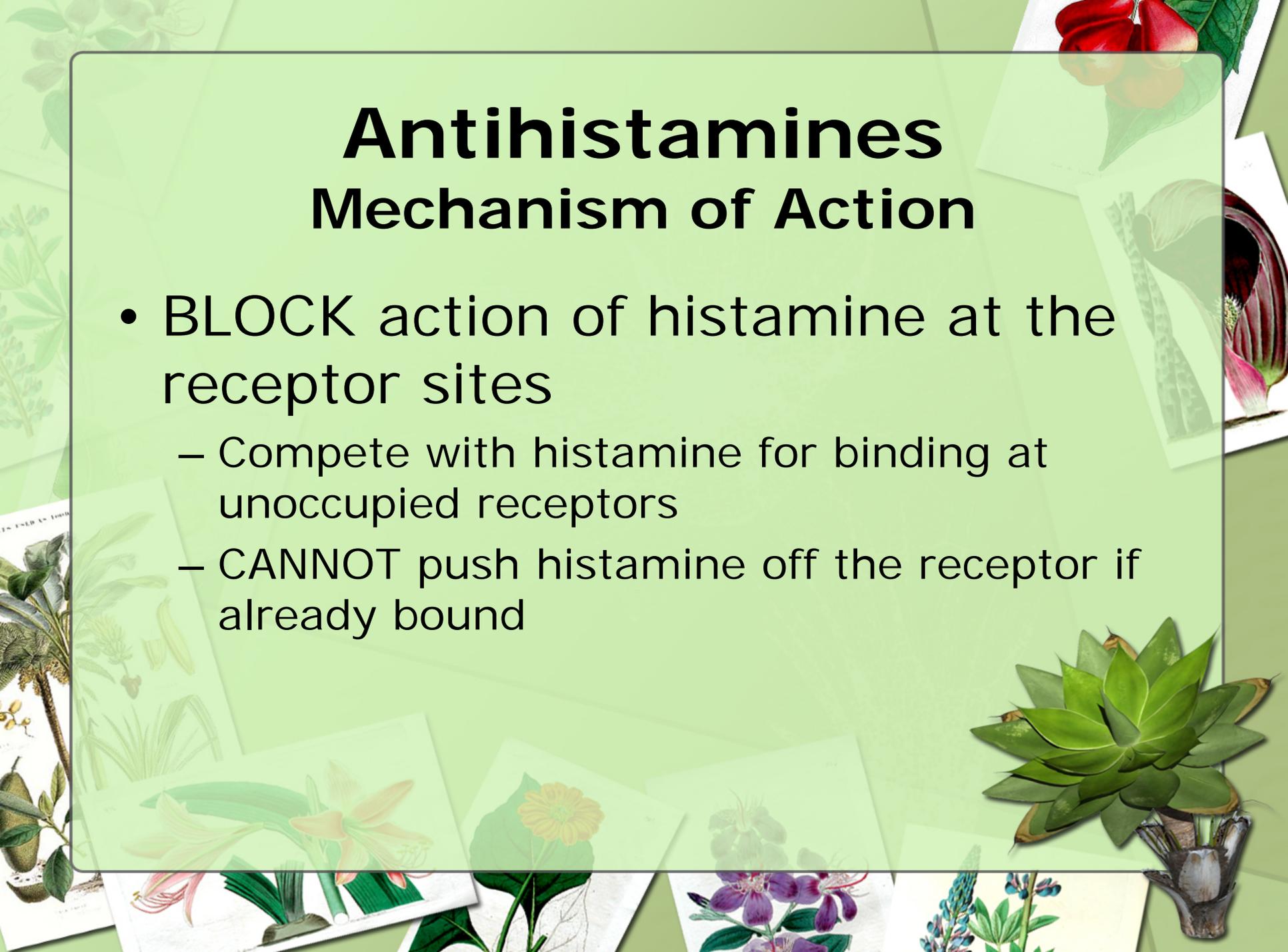
- Antihistamines have several effects
  - Antihistaminic
  - Anticholinergic
  - Sedative



# Antihistamines

## Mechanism of Action

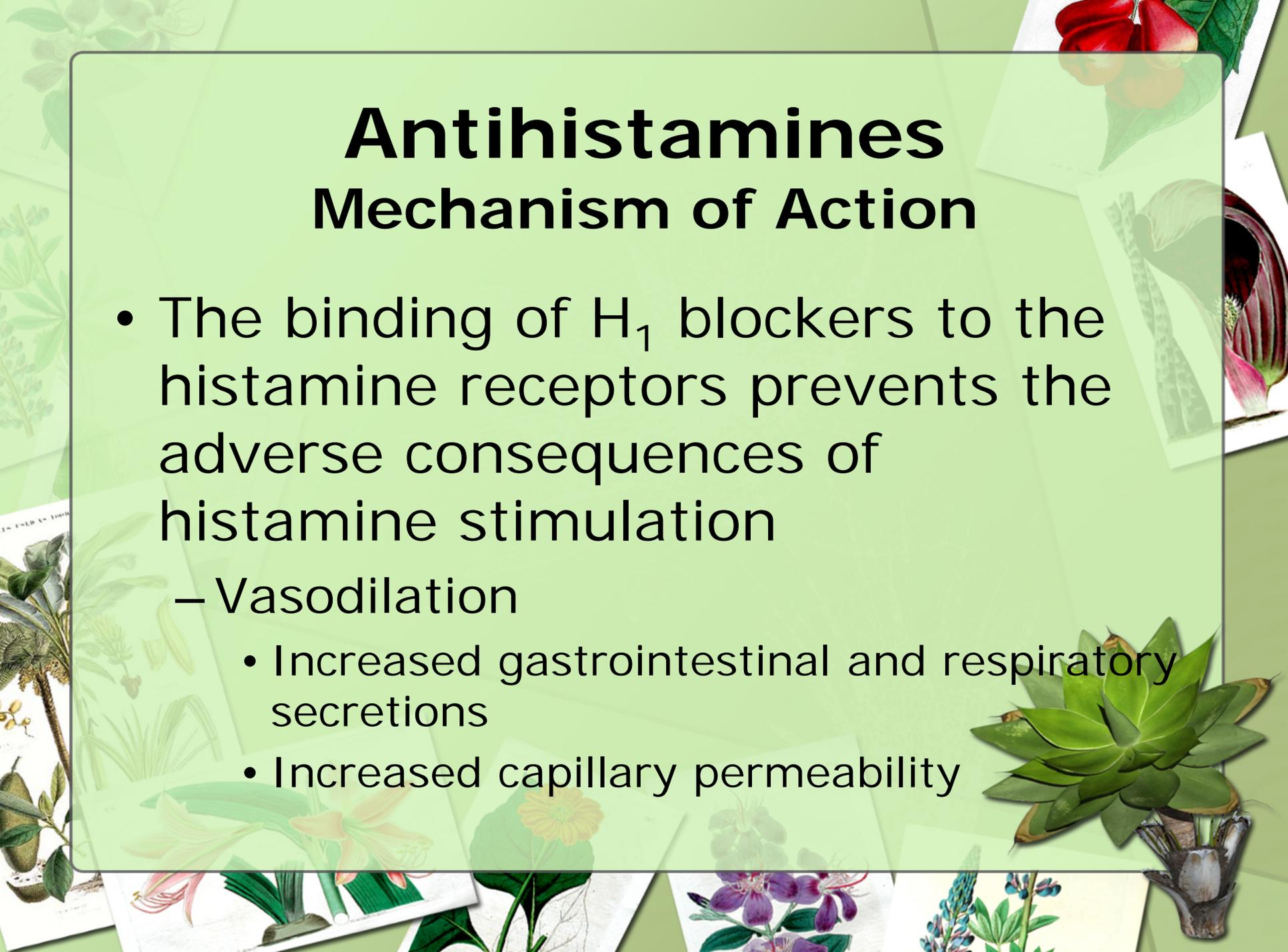
- BLOCK action of histamine at the receptor sites
  - Compete with histamine for binding at unoccupied receptors
  - CANNOT push histamine off the receptor if already bound



# Antihistamines

## Mechanism of Action

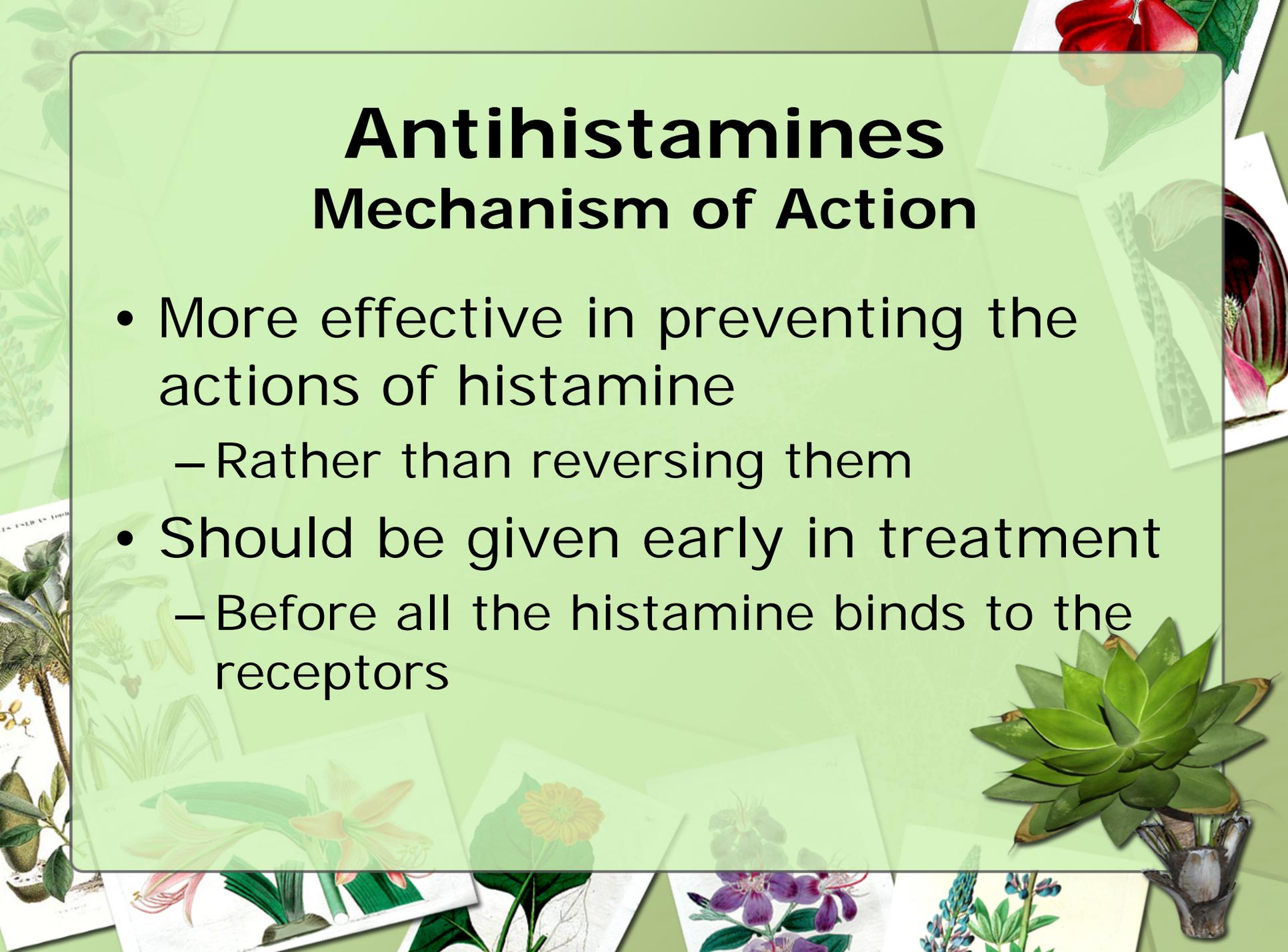
- The binding of H<sub>1</sub> blockers to the histamine receptors prevents the adverse consequences of histamine stimulation
  - Vasodilation
    - Increased gastrointestinal and respiratory secretions
    - Increased capillary permeability



# Antihistamines

## Mechanism of Action

- More effective in preventing the actions of histamine
  - Rather than reversing them
- Should be given early in treatment
  - Before all the histamine binds to the receptors



# Histamine vs. Antihistamine Effects

Cardiovascular (small blood vessels)

- Histamine effects:
  - Dilation and increased permeability (allowing substances to leak into tissues)
- Antihistamine effects:
  - Prevent dilation of blood vessels
  - Prevent increased permeability



# Histamine vs. Antihistamine Effects

Smooth Muscle (on exocrine glands)

- Histamine effects:
  - Stimulate salivary, gastric, lacrimal, and bronchial secretions
- Antihistamine effects:
  - Prevent salivary, gastric, lacrimal, and bronchial secretions

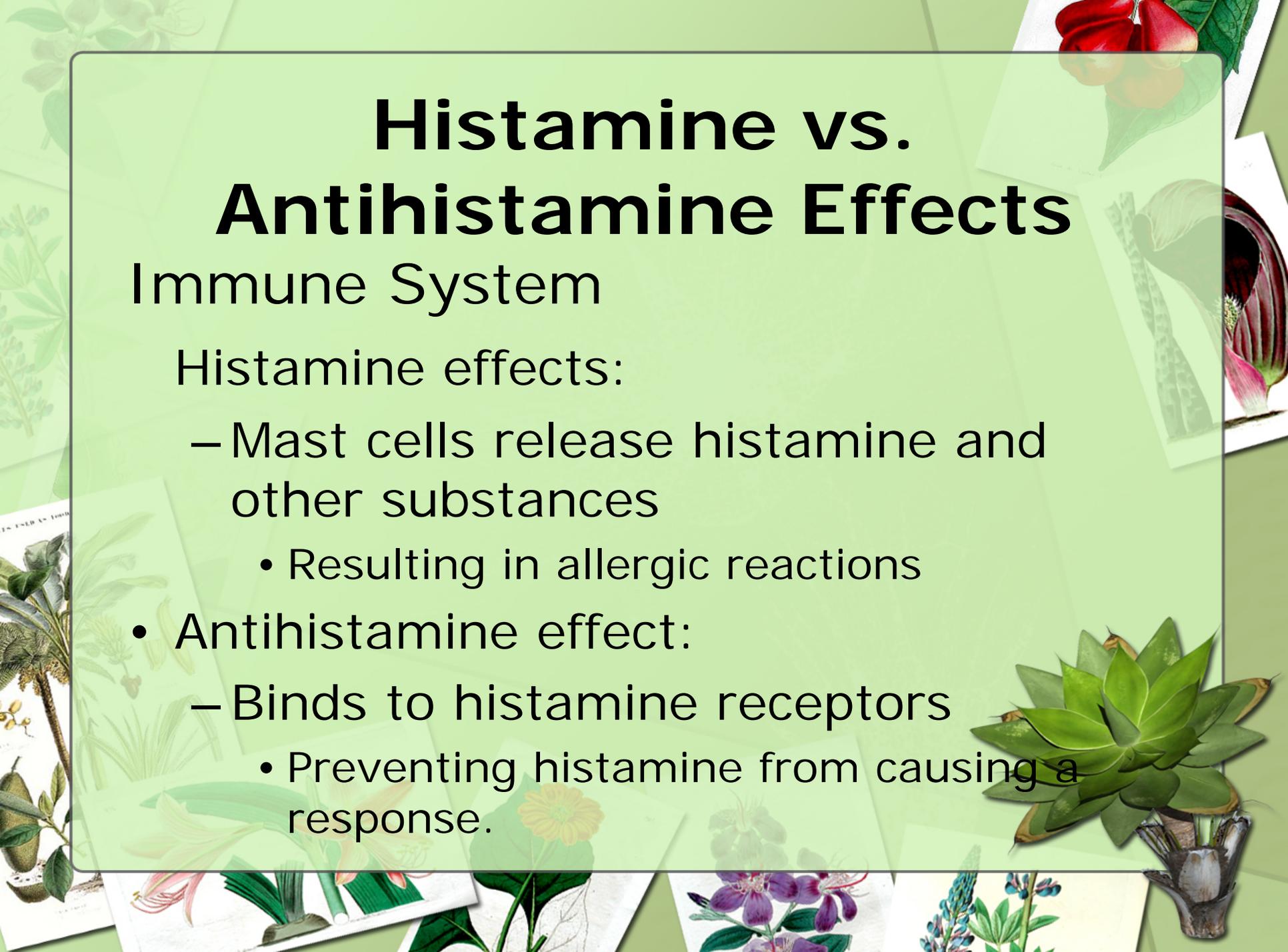


# Histamine vs. Antihistamine Effects

## Immune System

Histamine effects:

- Mast cells release histamine and other substances
  - Resulting in allergic reactions
- Antihistamine effect:
  - Binds to histamine receptors
    - Preventing histamine from causing a response.



# Antihistamines

## Other Effects

### Skin:

- Block capillary permeability, wheal-and-flare formation, itching

### Anticholinergic:

- Drying effect that reduces nasal, salivary, and lacrimal gland secretions
  - runny nose, tearing, and itching eyes

### Sedative:

- Some antihistamines cause drowsiness

# Antihistamines

## Therapeutic Uses

Management of:

- Nasal allergies
- Seasonal or perennial allergic rhinitis (hay fever)
- Allergic reactions
- Motion sickness
- Sleep disorders



# Antihistamines

## Therapeutic Uses

- Histamine-mediated disorders:
  - Allergic rhinitis  
(hay fever, mold and dust allergies)
  - Anaphylaxis
  - Angioneurotic edema
  - Drug fevers
  - Insect bite reactions
  - Urticaria (itching)



# Antihistamines

## Therapeutic Uses

- Relief of symptoms associated with the common cold
  - Sneezing, runny nose
  - Palliative treatment, not curative



# Antihistamines

## Side effects

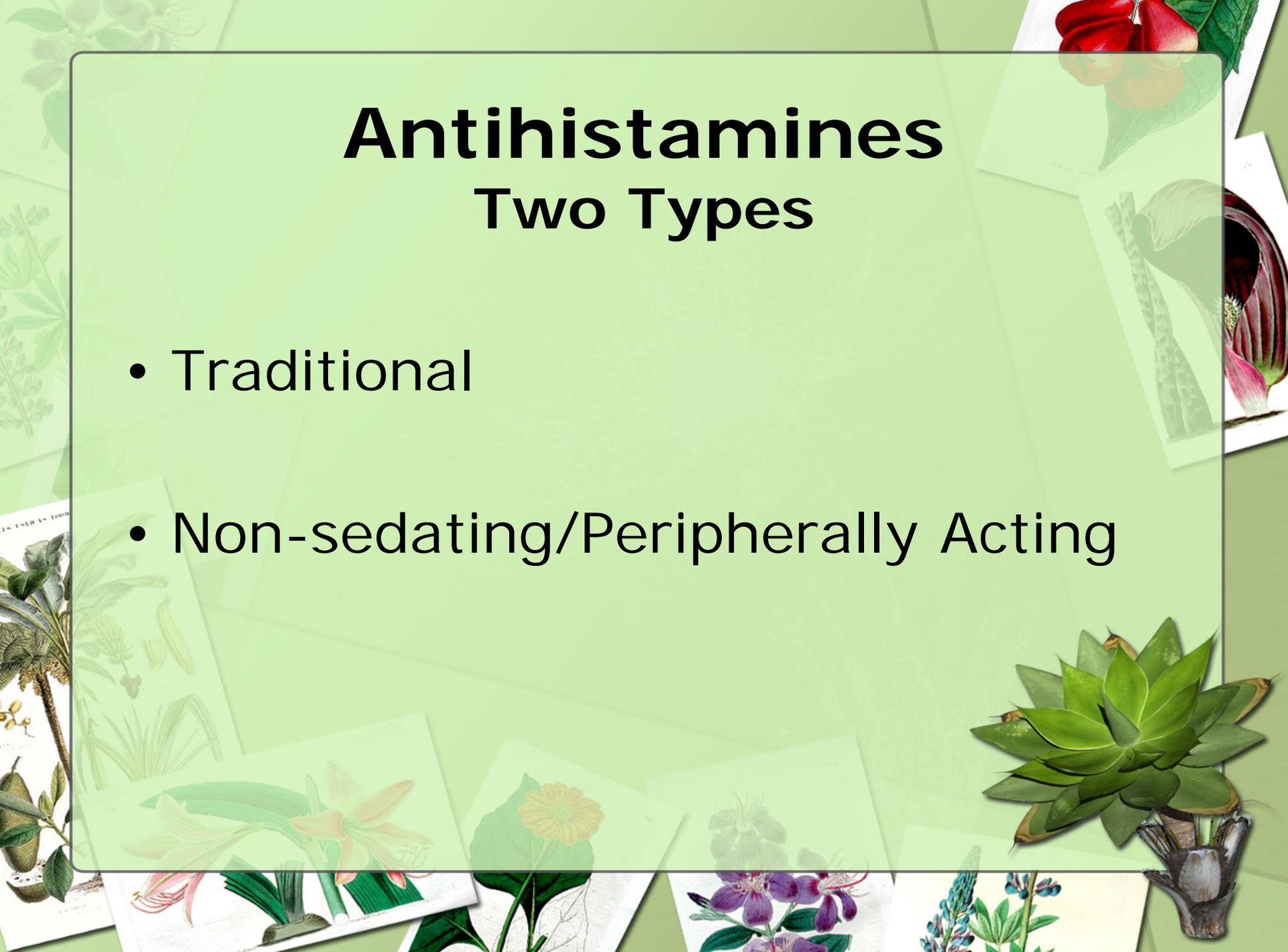
- Anticholinergic (drying) effects most common
  - Dry mouth
  - Difficulty urinating
  - Constipation
  - Changes in vision
  - Drowsiness
    - Mild drowsiness to deep sleep



# Antihistamines

## Two Types

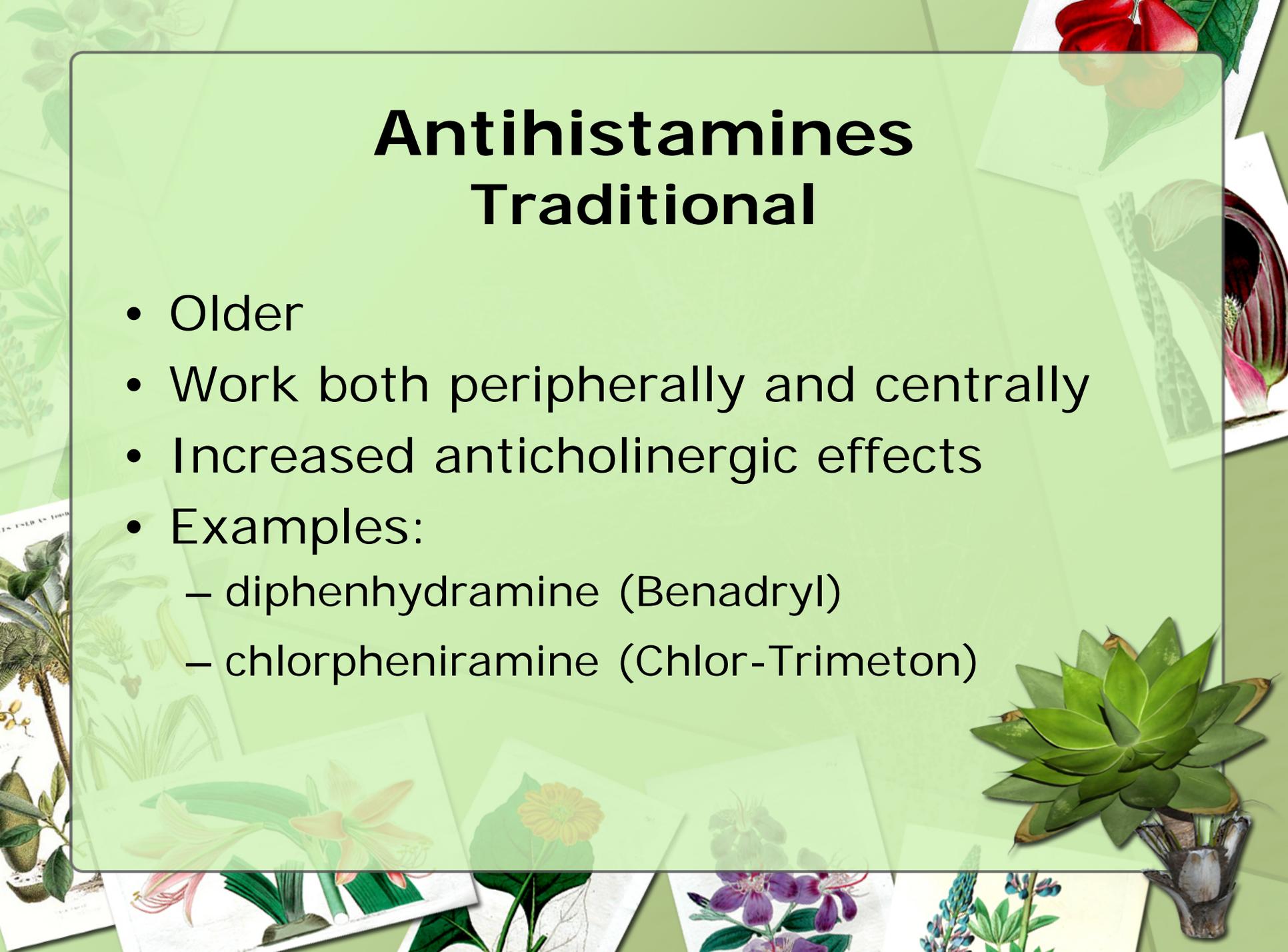
- Traditional
- Non-sedating/Peripherally Acting



# Antihistamines

## Traditional

- Older
- Work both peripherally and centrally
- Increased anticholinergic effects
- Examples:
  - diphenhydramine (Benadryl)
  - chlorpheniramine (Chlor-Trimeton)



# Antihistamines

## Nonsedating/Peripherally Acting

- Developed to eliminate unwanted side effects
  - Mainly sedation
- Work peripherally to block the actions of histamine
  - Thus, fewer CNS side effects
- Longer duration of action
  - Increases compliance





# Antihistamines

## Nursing Implications

- Gather data about the condition or allergic reaction that required treatment
  - Assess for drug allergies
- Contraindicated in the presence of acute asthma attacks and lower respiratory diseases
- Use with caution
  - Increased intraocular pressure
  - Cardiac or renal disease, hypertension
  - Asthma, COPD
  - Peptic ulcer disease, BPH, or pregnancy

# Antihistamines

## Nursing Implications

- Instruct patients to report excessive sedation, confusion, or hypotension
- Avoid driving or operating heavy machinery
- Avoid alcohol or other CNS depressants
- Do not take these medications with other prescribed or OTC medications without checking with prescriber

# Antihistamines

## Nursing Implications

- Best tolerated when taken with meals
  - Reduces GI upset.
- If dry mouth occurs
  - Teach patient to perform frequent mouth care, chew gum, or suck on hard candy (preferably sugarless)
- Monitor for intended therapeutic effects.

# Decongestants



# Nasal Congestion

- Excessive nasal secretions
- Inflamed and swollen nasal mucosa
- Primary causes:
  - Allergies
  - Upper respiratory infections (common cold)



# Decongestants

- Two main types are used
  - Adrenergics (largest group)
  - Corticosteroids
- Two dosage forms
  - Oral
  - Inhaled/topically
    - Applied to the nasal membranes



# Decongestants

## Oral

- Prolonged decongestant effects
  - Delayed onset
- Effect less potent than topical
- No rebound congestion
- Exclusively adrenergics
- Examples:
  - phenylephrine
  - pseudoephedrine (Sudafed)



# Decongestants

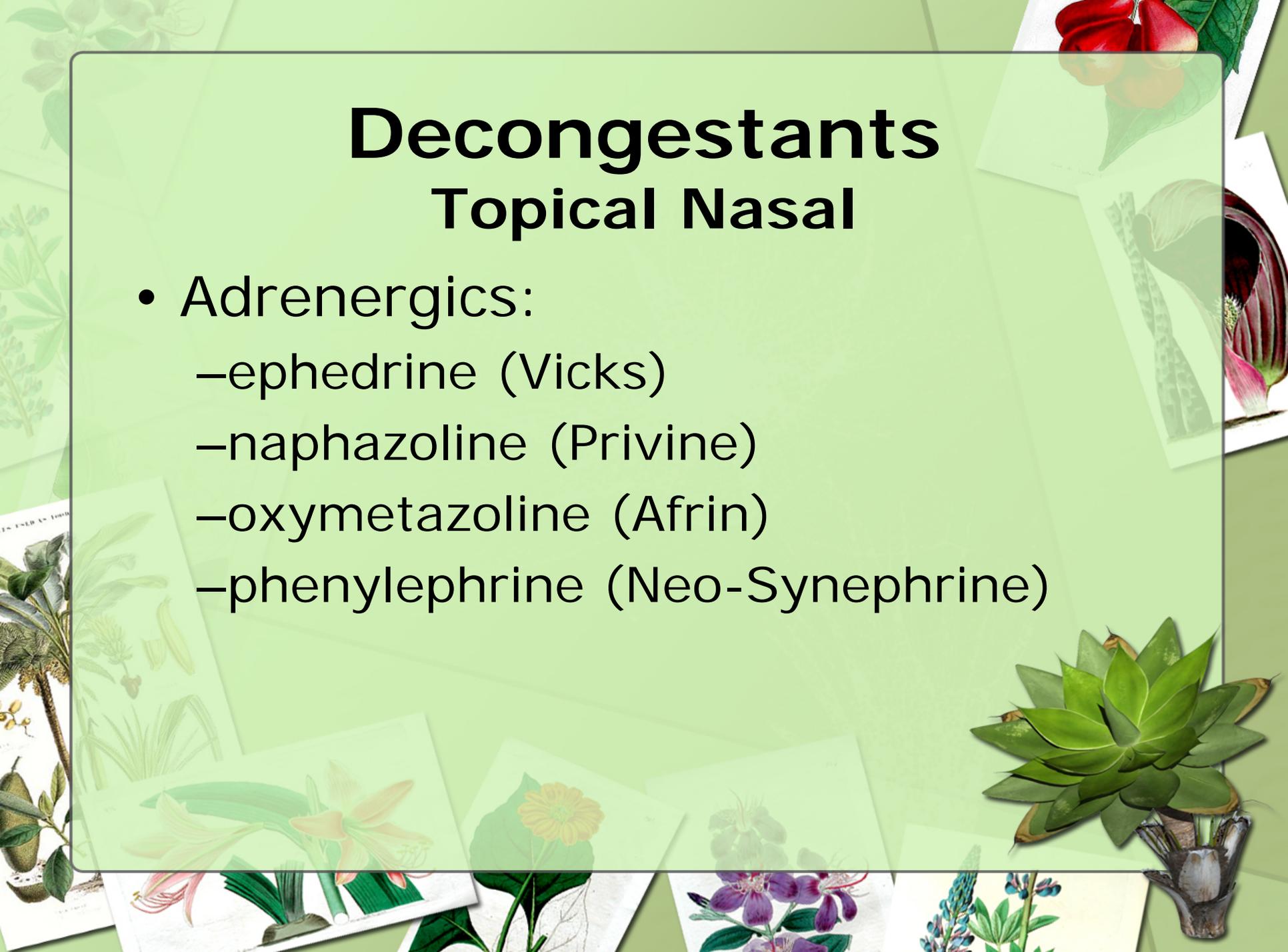
## Topical Nasal

- Adrenergics and steroids
- Prompt onset
- Potent
- Steroids
  - Sustained use over several days
- Adrenergics
  - Can cause rebound congestion
    - Making the condition worse

# Decongestants

## Topical Nasal

- Adrenergics:
  - ephedrine (Vicks)
  - naphazoline (Privine)
  - oxymetazoline (Afrin)
  - phenylephrine (Neo-Synephrine)



# Decongestants

## Topical Nasal

- Intranasal Steroids:
  - beclomethasone dipropionate (Beconase, Vancenase)
  - flunisolide (Nasalide)
  - Budesonide (Pulmicort, Rhinocort)
  - Fluticasone (Flonase)
  - Triamcinolone (Nasacort)



# Nasal Decongestants

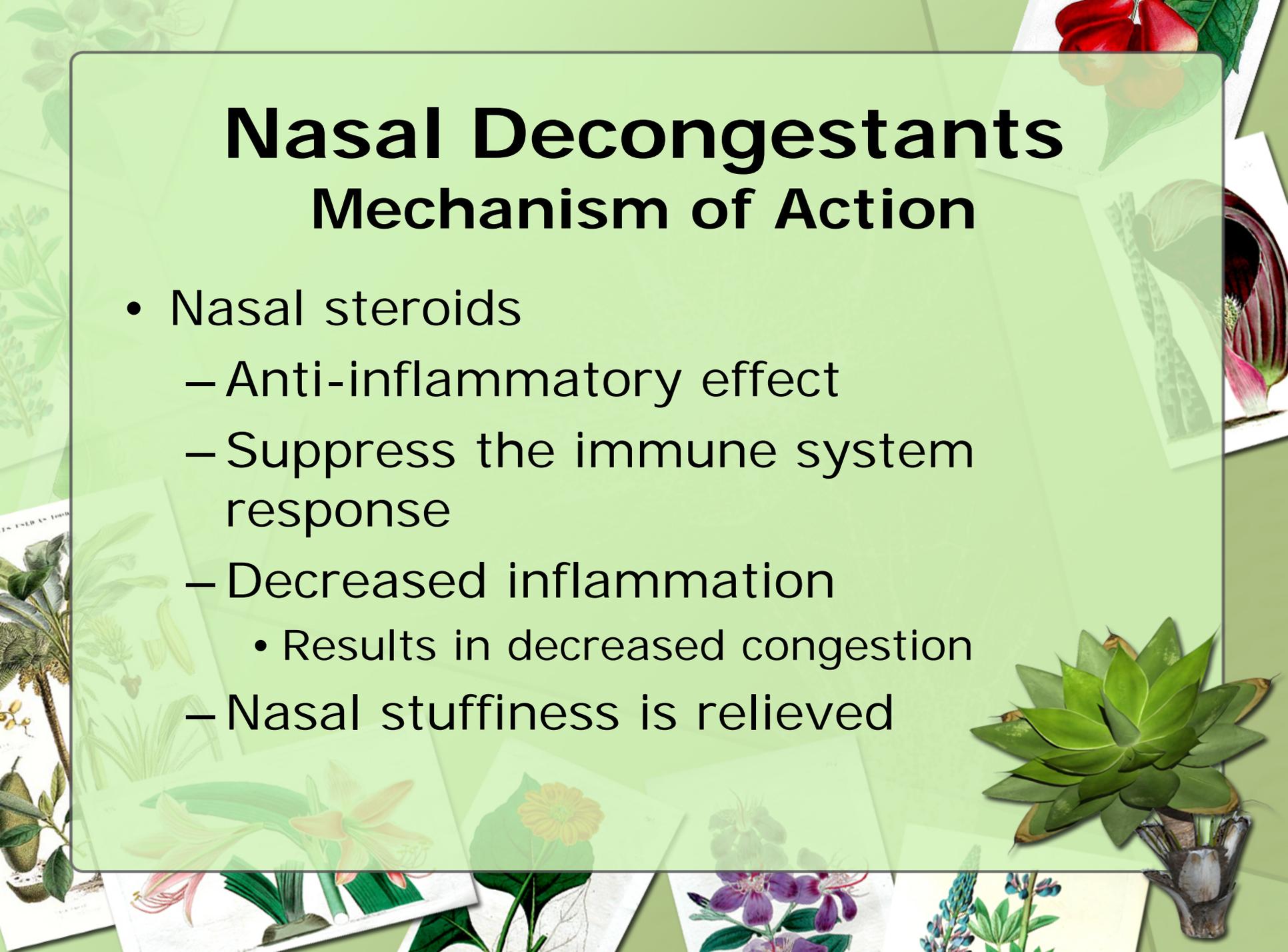
## Mechanism of Action

- Site of action
  - Blood vessels surrounding nasal sinuses
- Adrenergics
  - Constrict small blood vessels that supply upper respiratory structures
    - Tissues shrink
    - Nasal secretions better able to drain
  - Nasal stuffiness is relieved

# Nasal Decongestants

## Mechanism of Action

- Nasal steroids
  - Anti-inflammatory effect
  - Suppress the immune system response
  - Decreased inflammation
    - Results in decreased congestion
  - Nasal stuffiness is relieved



# Nasal Decongestants

## Drug Effects

- Shrink engorged nasal mucous membranes
- Relieve nasal stuffiness



# Nasal Decongestants

## Therapeutic Uses

- Relief of nasal congestion associated with:
  - Acute or chronic rhinitis
  - Common cold
  - Sinusitis
  - Hay fever
  - Other allergies







# Nasal Decongestants

## Nursing Implications

- Patients should avoid caffeine & caffeine-containing products
- Report a fever, cough, or other symptoms lasting longer than a week
- Monitor for intended therapeutic effects

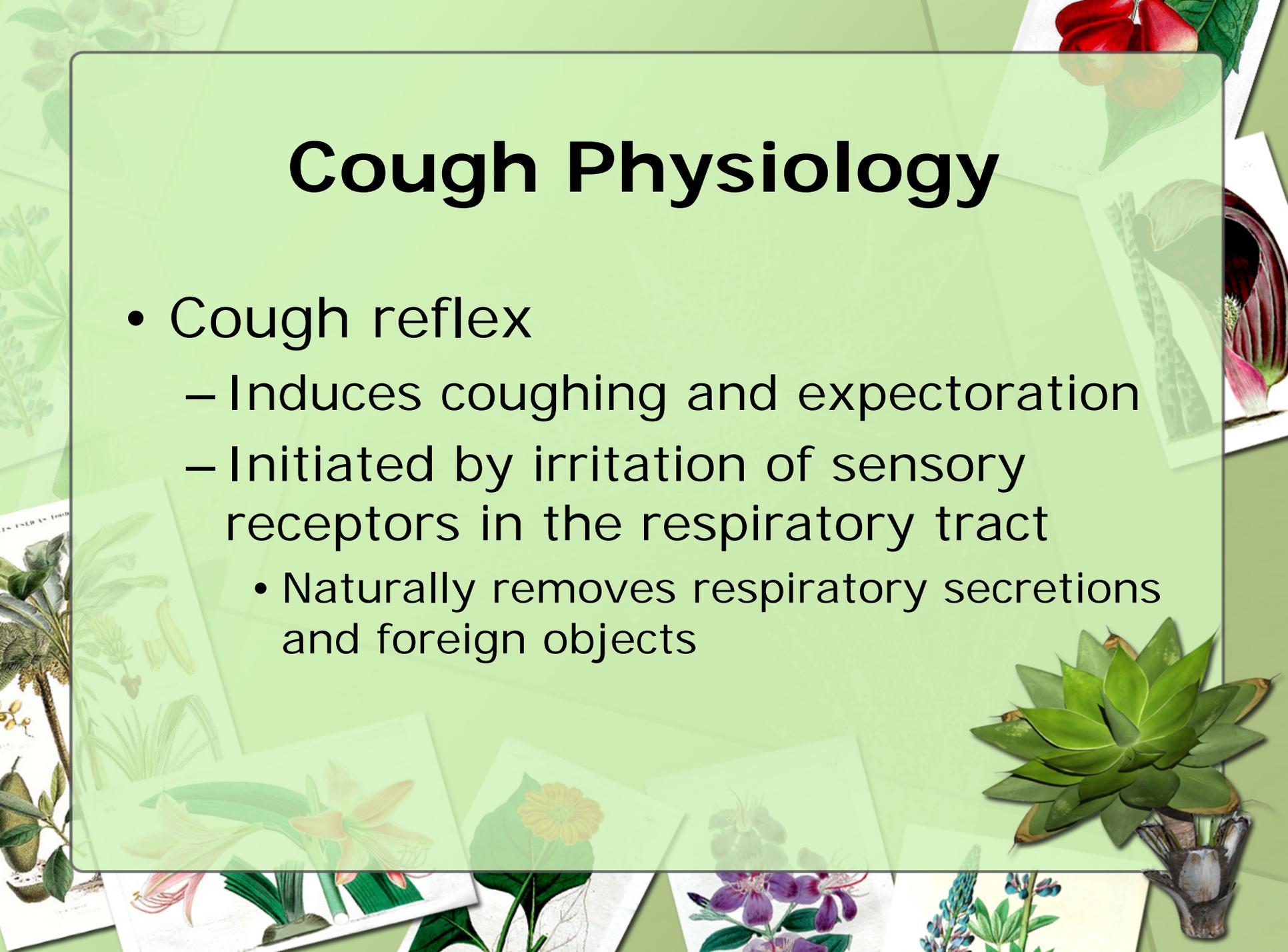


# Antitussives



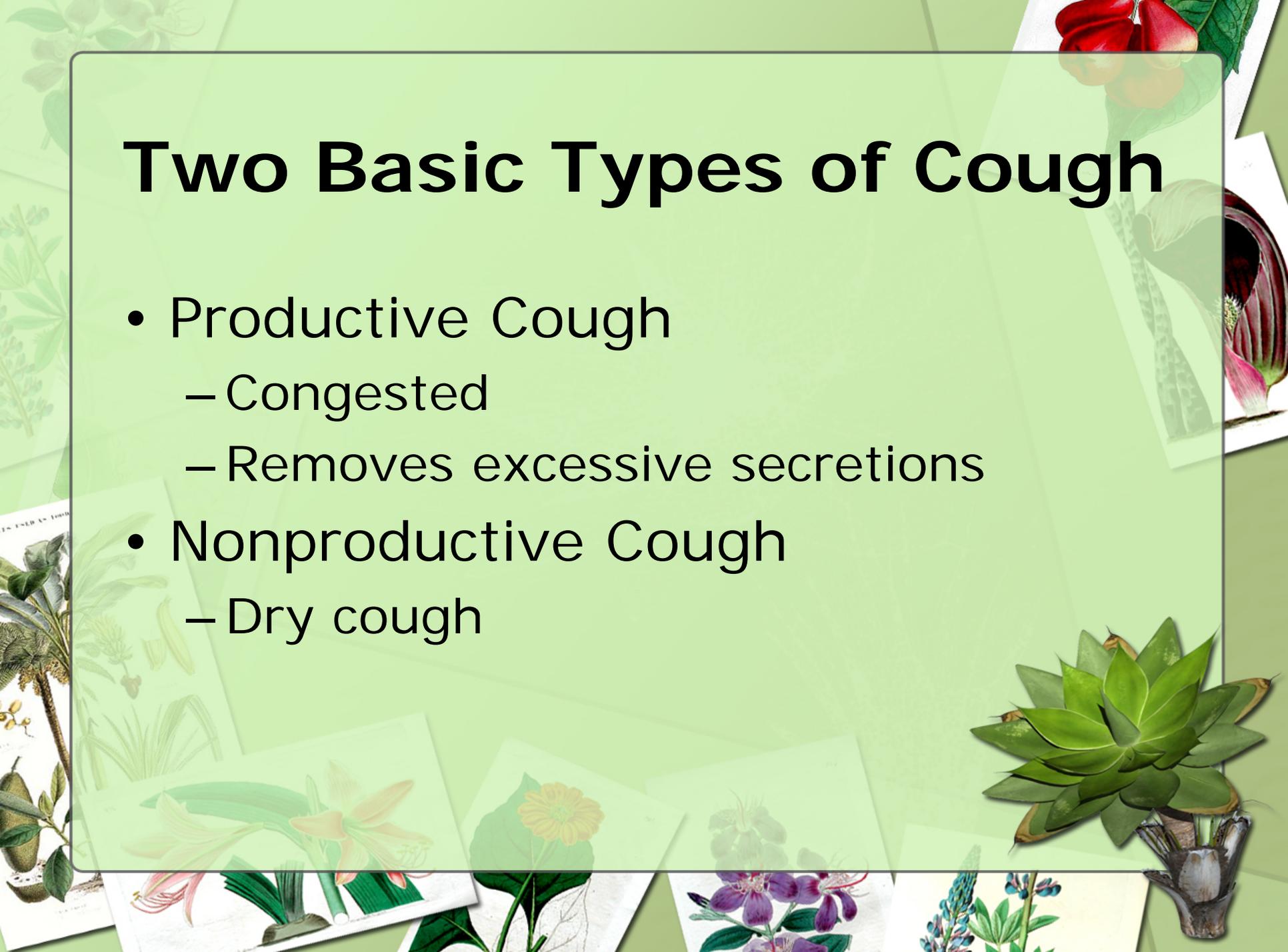
# Cough Physiology

- Cough reflex
  - Induces coughing and expectoration
  - Initiated by irritation of sensory receptors in the respiratory tract
    - Naturally removes respiratory secretions and foreign objects



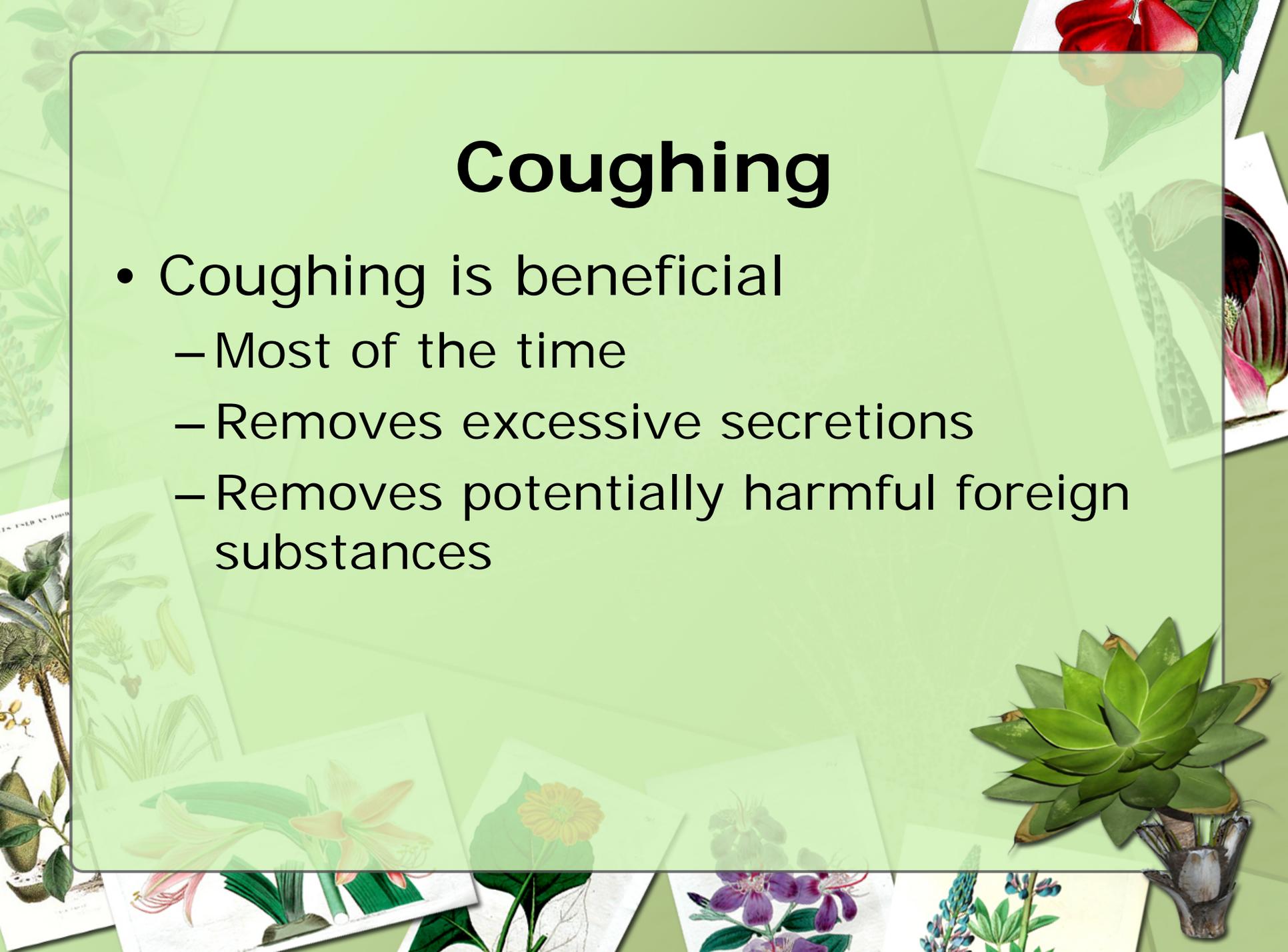
# Two Basic Types of Cough

- Productive Cough
  - Congested
  - Removes excessive secretions
- Nonproductive Cough
  - Dry cough



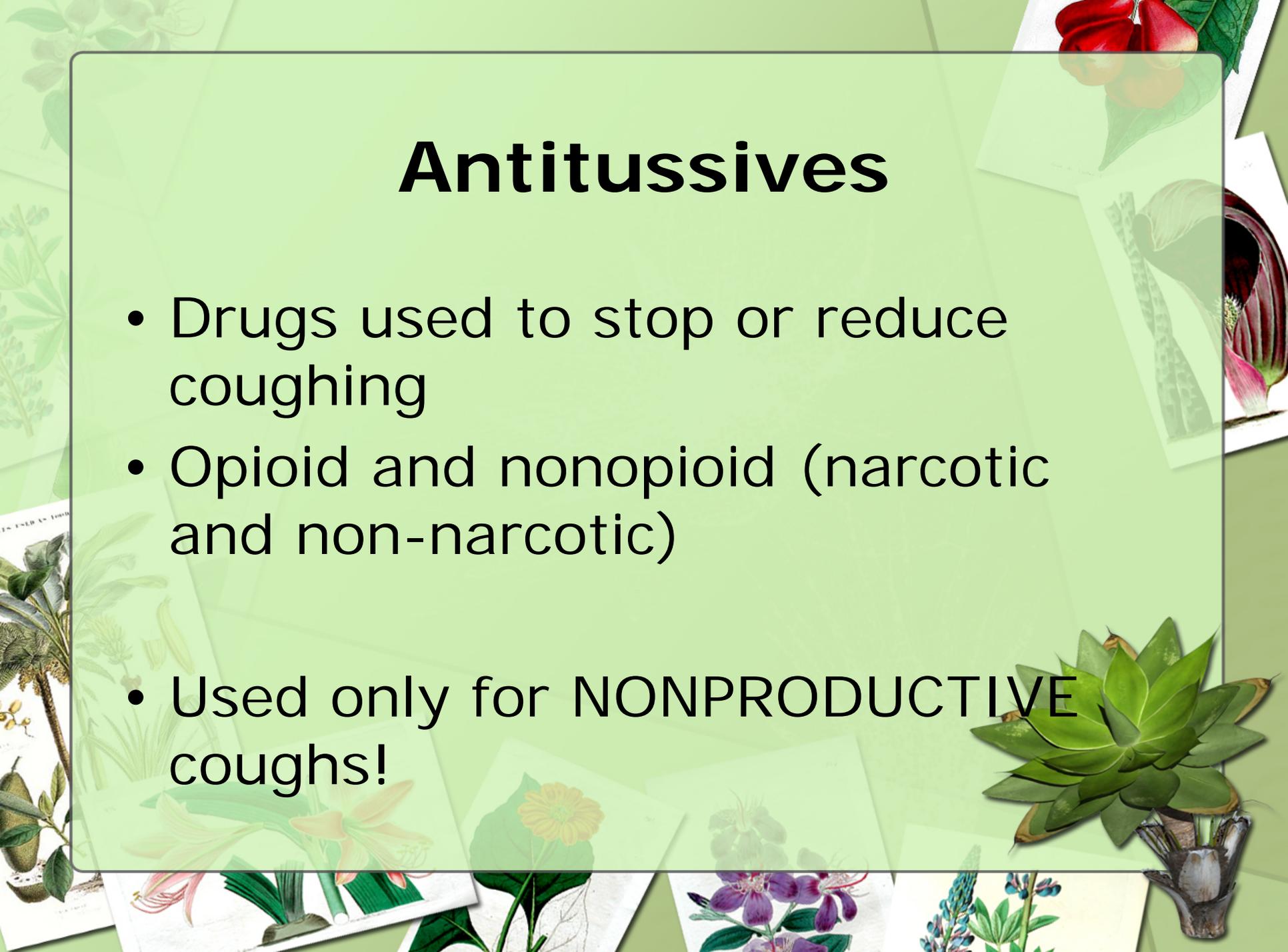
# Coughing

- Coughing is beneficial
  - Most of the time
  - Removes excessive secretions
  - Removes potentially harmful foreign substances



# Antitussives

- Drugs used to stop or reduce coughing
- Opioid and nonopioid (narcotic and non-narcotic)
- Used only for **NONPRODUCTIVE** coughs!



# Antitussives

## Opioid

- Mechanism of Action
  - Suppress the cough reflex by direct action on the cough center in the medulla.
- Examples:
  - codeine (Robitussin A-C, Dimetane-DC)
  - hydrocodone



# Antitussives

## Nonopioid

### Mechanism of Action

- Suppress the cough reflex
  - Numbing the stretch receptors in the respiratory tract
  - Preventing the cough reflex from being stimulated
- Examples:
  - benzonatate (Tessalon)
  - dextromethorphan (Vicks Formula 44, Robitussin-DM)



# Antitussives

## Therapeutic Uses

- Used to stop the cough
  - When the cough is nonproductive and/or harmful



# Antitussives

## Side Effects

- Benzonatate
  - Dizziness, headache, sedation
- Dextromethorphan
  - Dizziness, drowsiness, nausea
- Opioids
  - Sedation, nausea, vomiting, lightheadedness, constipation



# Antitussive Agents

## Nursing Implications

- Perform respiratory and cough assessment
  - Assess for allergies
- Instruct patients to avoid driving or operating heavy equipment
  - Possible sedation, drowsiness, or dizziness
- Chewable tablets or lozenges
  - do not drink liquids for 30 to 35 minutes afterward

# Antitussive Agents

## Nursing Implications

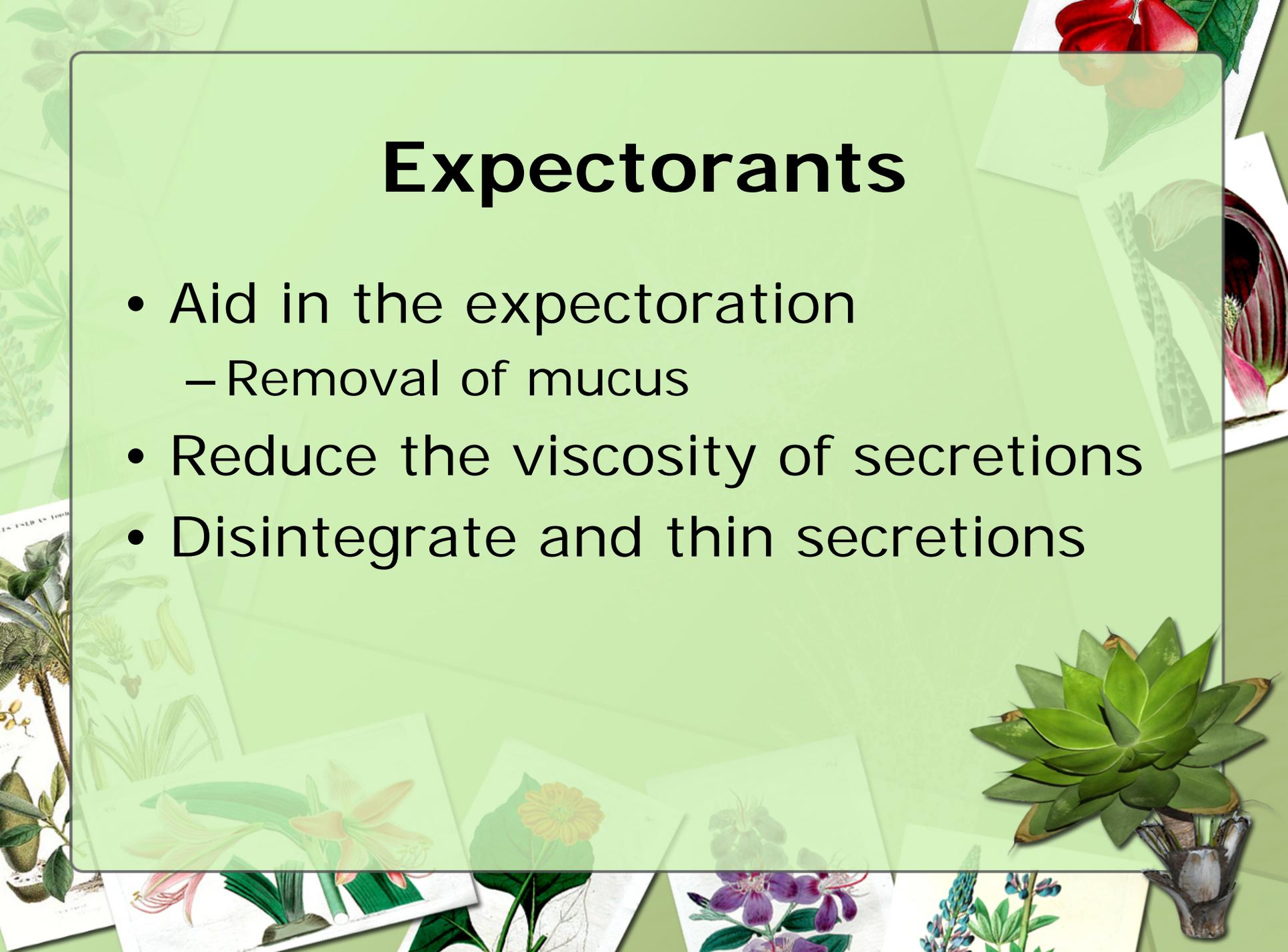
- Report any of the following symptoms to the caregiver:
  - Cough that lasts more than a week
  - A persistent headache
  - Fever
  - Rash
- Use in **NONPRODUCTIVE** coughs only!
- Monitor for intended therapeutic effects.

# Expectorants



# Expectorants

- Aid in the expectoration
  - Removal of mucus
- Reduce the viscosity of secretions
- Disintegrate and thin secretions

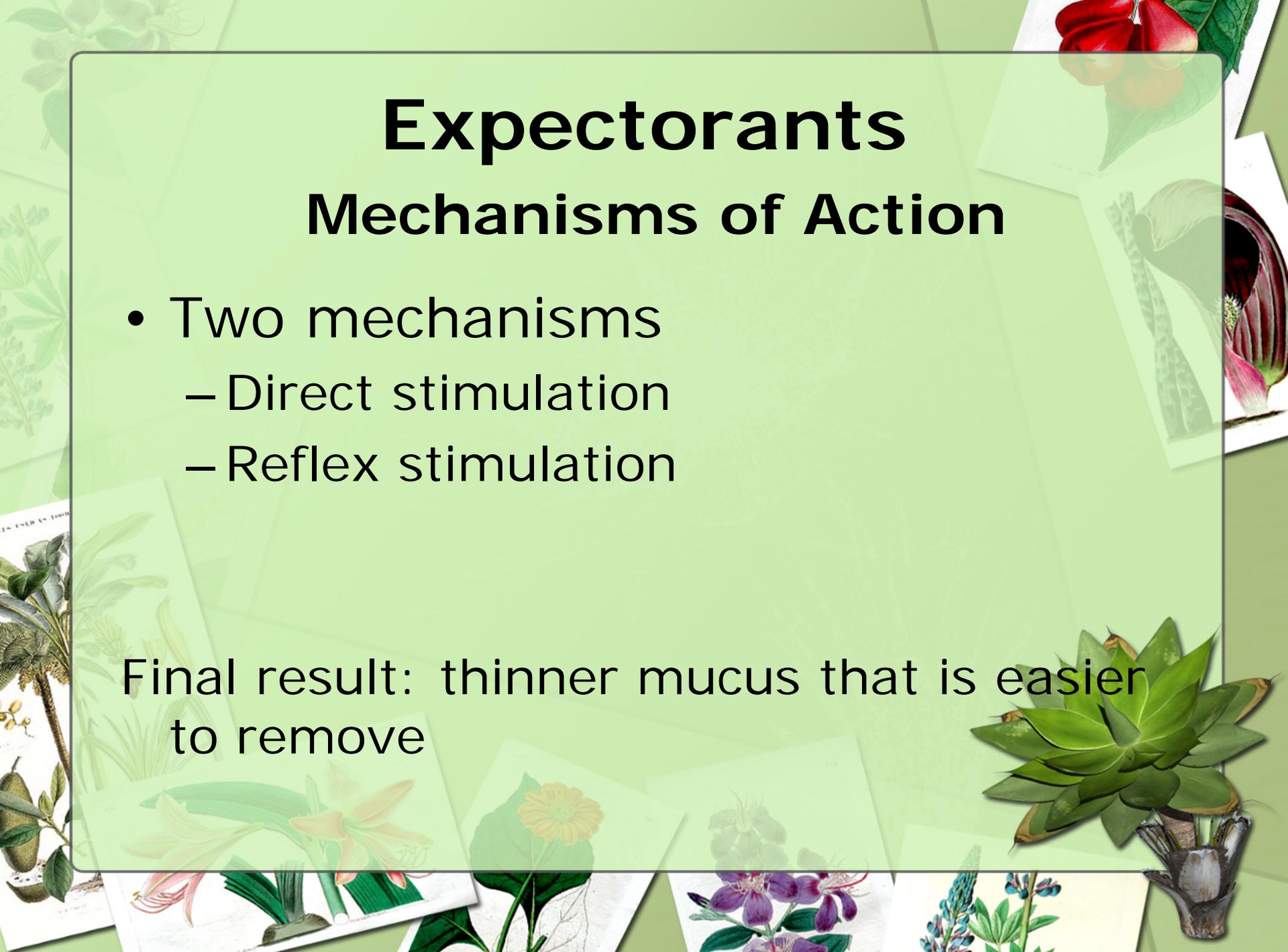


# Expectorants

## Mechanisms of Action

- Two mechanisms
  - Direct stimulation
  - Reflex stimulation

Final result: thinner mucus that is easier to remove



# Expectorants

## Mechanisms of Action

- Direct stimulation
  - The secretory glands are stimulated directly to increase their production of respiratory tract fluids.
- Examples:
  - Iodinated glycerol
  - Potassium iodide



# Expectorants

## Mechanisms of Action

Reflex stimulation:

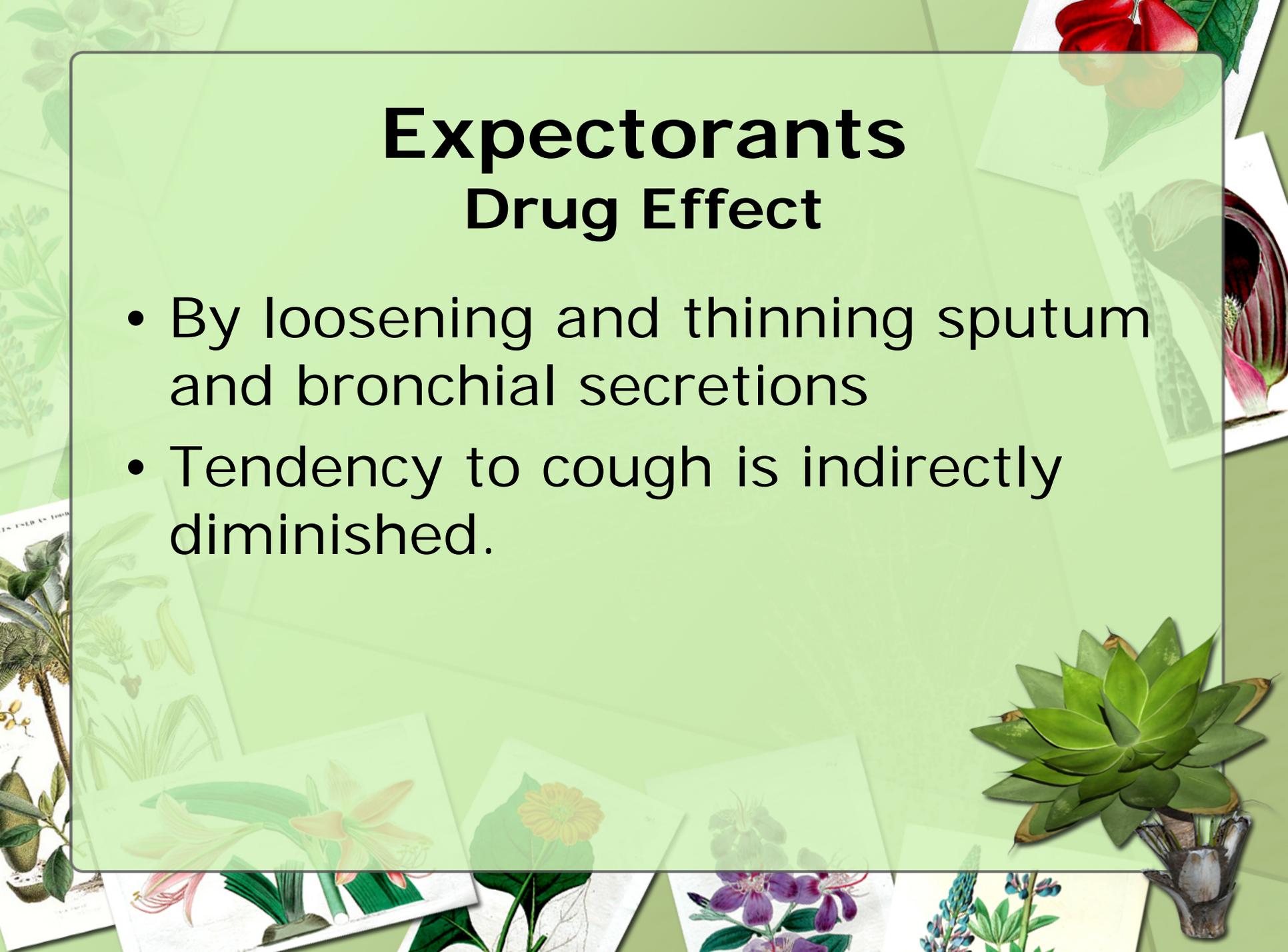
- Agent causes irritation of the GI tract.
- Loosening and thinning of respiratory tract secretions occur in response to this irritation.
- Examples
  - Guaifenesin
  - Syrup of ipecac



# Expectorants

## Drug Effect

- By loosening and thinning sputum and bronchial secretions
- Tendency to cough is indirectly diminished.



# Expectorants

## Therapeutic Uses

- Used for the relief of nonproductive coughs associated with:
  - Common cold
  - Bronchitis
  - Laryngitis
  - Pertussis
  - Influenza
  - Measles
  - Pharyngitis
  - Coughs caused by chronic paranasal sinusitis



# Expectorants

## Common Side Effects

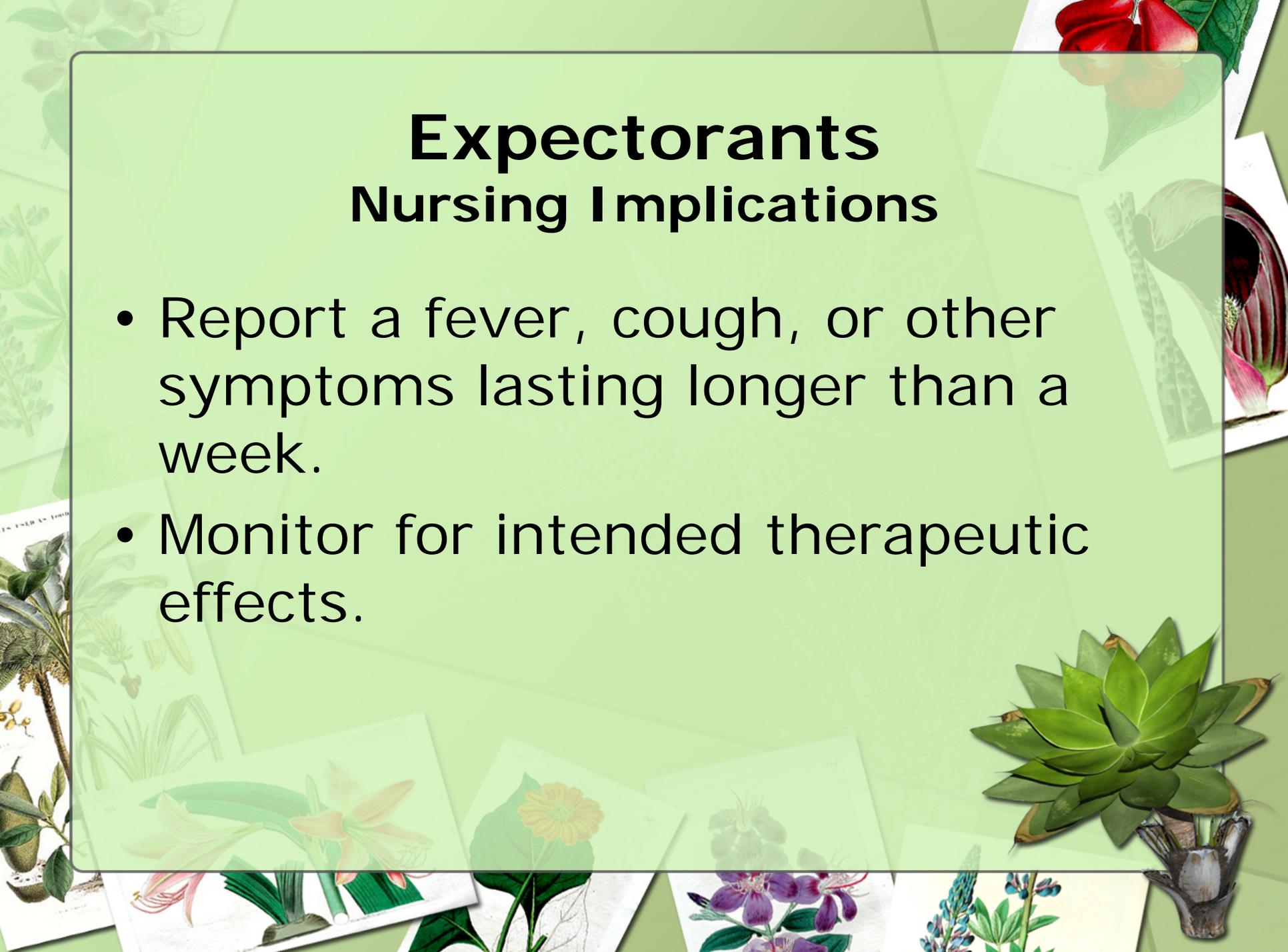
Guaifenesin	Iodinated glycerol	Potassium iodide
<ul style="list-style-type: none"><li>• Nausea</li><li>• Vomiting</li><li>• Gastric irritation</li></ul>	<ul style="list-style-type: none"><li>• GI irritation</li><li>• Rash</li><li>• Enlarged thyroid gland</li></ul>	<ul style="list-style-type: none"><li>• Iodism</li><li>• Nausea</li><li>• Vomiting</li><li>• Taste perversion</li></ul>



# Expectorants

## Nursing Implications

- Report a fever, cough, or other symptoms lasting longer than a week.
- Monitor for intended therapeutic effects.



# Mucolytic

- Example
  - Acetylcysteine (Mucomyst)
- Action
  - Disruption of the chemical bonds between mucoprotein molecules of the respiratory secretions
  - Result
    - Liquefaction of the mucous



# Mucolytic

- Uses
  - Facilitate removal of viscous, tenacious mucous
  - Antidote for acetaminophen OD
- Side effects
  - n/v, stomatitis, rhinorrhea
  - Rash, fever, drowsiness
  - Chest tightness, bronchoconstriction, respiratory tract irritation
  - Increase amount respiratory secretions



# Mucolytic

- Nursing responsibilities
  - Disagreeable odor
    - Disappears quickly
  - May cause facial stickiness
    - Nebulizer
    - Instruct patient to wash face

