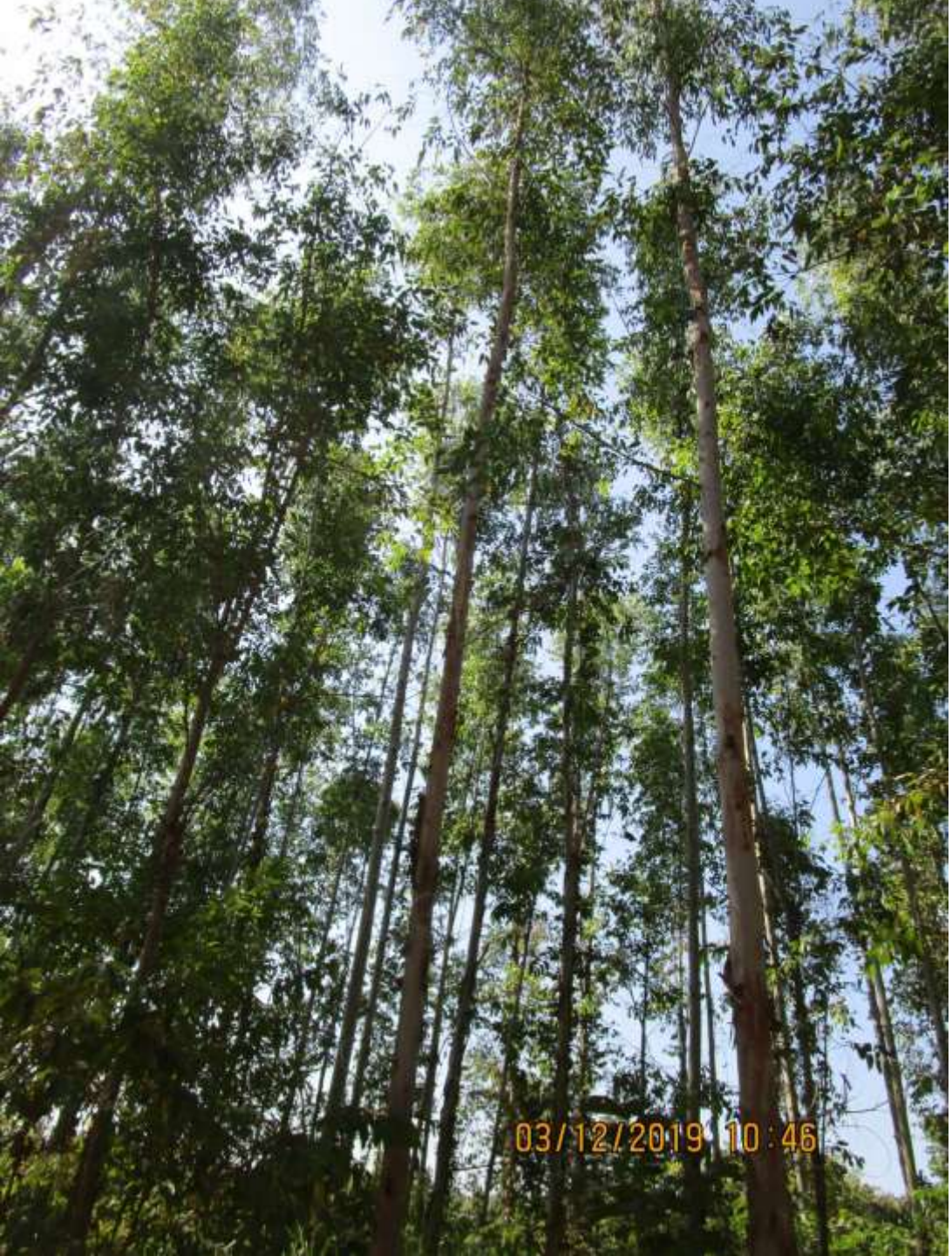
Stem Diseases

N. S. K. Harsh
Former Scientist-G & Group Coordinator (Research)
Forest Research Institute, Dehradun, India
nirmalharsh57@gmail.com; Mo +919758101148

Currently International Forest Disease (Pathology) Specialist in Improved Sanitary and Phytosanitary (SPS) Handling in Greater Mekong Subregion (GMS) Trade Project with Asian Development Bank at Laos



Pink Disease of Eucalyptus

- The pink disease is widespread in eucalypt plantations throughout the country with incidence varying from 5 to 75 per cent depending upon the rainfall (> 2000 mm) and microclimatic conditions of the area as well as the species. *E. tereticornis* and *E. camaldulensis* are the severely affected species in the low elevated areas, while *E. grandis* is the important species affected in high ranges. Karnataka, Kerala are major states affected
- Usually the pink disease affects the two-year-old plants and above, but infection of one-year-old plants and coppice crops is not uncommon. The pathogen possibly infects the main stem or branches through the lenticels. Tissues of the inner bark, including cambium are killed and show prominent browning.
- Pathogen - *Erythrycium samonicolor* (=*Corticium salmonicolor*) . There are four stages of the pathogen –

1.. Pustules – appear on branches and stem afetr infection in the beginning of monsoon as pink to salmon coloured sterile cellular bodies up to 1 mm in dia. The infected area becomes depressed and develop vertical splitting on the bark, initiation of cankers.

2. Cobweb - the development of cobweb stage of the fungus during the monsoon. As thin white mycelium originating from pustules or earlier fruit bodies

3. Necator – are orange red, about 2 mm in dia and develop on the upper side of the infected branches/ twigs exposed to sun in which conidia develop during monsoon.

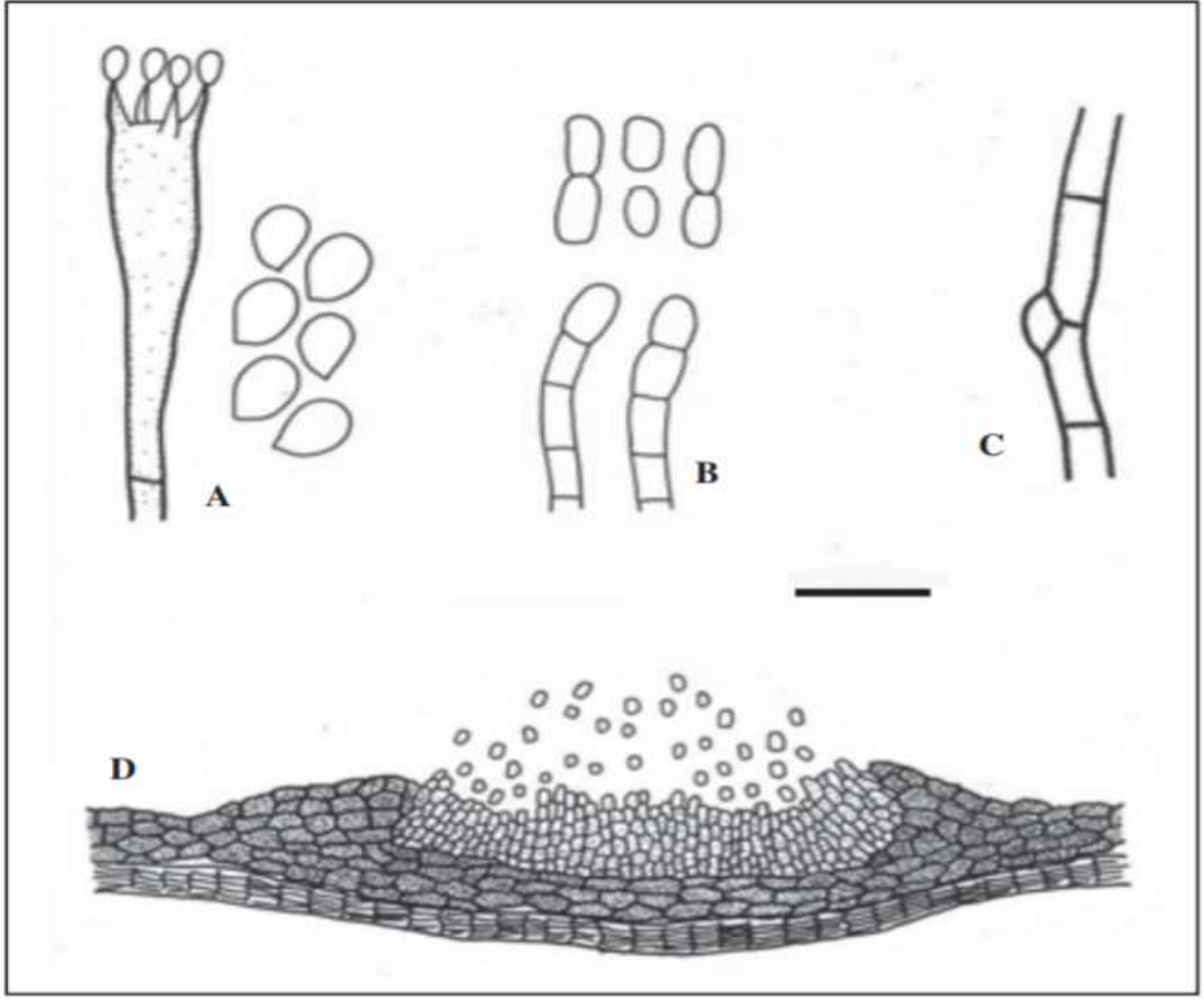
4. Pink incrustation – perfect stage of the pathogen, develops as thin, light pink incrustation on the bark, develops over the infected area. Numerous club-shaped basidia with basidiospores, a source of inocula for fresh infection are produced. Oozing of kino from the canker also occurs in certain cases.

- The apical shoot above the canker dies when the stem is completely girdled.
- Numerous epicormic shoots develop from the healthy stem just below the canker. The shoots also get infected and killed following wilting and drying up. One of these shoots usually survives and becomes a leader shoot, which does not escape the infection in the following season. Thus, infected trees, which appear bushy due to repeated infections became frail and weak.
- The yield and productivity of plantation reduce considerably as the trees show negative growth



Epicormic branches, die back of twigs and branches and pink incrustation

a & b, Cobweb, epicormic branches; c & d, Canker; e, epicormic branches and breakage; f, girdling and die back of twigs and branches



A. Basidia and basidiospores, B. Conidia and conidiophores, C. Clamp connection, D. Cross section of Necator showing conidia

Control and management

The disease can be successfully controlled through early recognition of the symptoms followed by prompt application of suitable fungicides. Bordeaux mixture, which is an aqueous suspension of CuSO4 : CaO: H2 O (1:2:10), and a brush-on formulation of tridemorph, applied at regular intervals have been shown to be effective in controlling the disease.

These measures are unlikely to be economical, nor practicable, in forest tree plantations. The possible long-term solution for managing the pink disease in eucalypts appears to be through species selection and tree improvement , use of species, provenances or clones which are resistant to pink disease, especially in high-risk regions with high rainfall. Selection of such trees is most advanced in southern India, where clonal propagation of *E. tereticornis* and selection of clones resistant to both leaf blight and pink disease has been successful.

Eucalyptus species and progenies from trees, which have escaped from infection in high disease incidence areas need to be selected and clonally propagated. The improvement through hybridization, though time consuming, may also be attempted for long-term disease control. *Eucalyptus torreleana* is found resistant to pink disease, so its crosses with *E. camaldulensis* and *E. tereticornis* have been developed as hybrids.

Sunscald in Poplar

SYMPTOMS and CAUSES

- **Winter sunscald is injury from rapid changes in bark temperature during cold and sunny winter days. Exposed bark, especially on species with dark bark, becomes much warmer on the sunny side than the air during the days but cools very rapidly after sunset. The rapid temperature changes can result in bark injury that usually occurs in the southwest side of the tree. Bark temperature reaches its maximum in mid-afternoon when the sun is in southwest quadrant (Dakshinayan) and consequently injury usually occurs most severely in that section of the tree. Canker formation is followed after bark injury. The cankers thus formed are longitudinal and extends sometimes to the length of trees. However, the trees suffering from winter sunscald often severely cankered on the southwest side usually survive the injury.**
- **Sun scalds can be prevented in newly planted or recently exposed trees by wrapping of trees with protective materials like kraft paper from the ground to the first branches for at least two years, where the danger of temperature injury may appear slight. The application of white water base paint has also been found effective.**
- **A wood parasite *Lasiodipodia palmarum* colonizes the affected bark resulting in widening if canker. Damage due to sunscald is usually observed during first 2-3 years of tree growth.**

Heart Rot Disease in Sal (*Shorea robusta*)

Heart rot – decay in the heartwood of standing trees

a) Sal high forests – incidence and volume of decay is high – nearly 70% trees affected resulting 10% loss in wood volume

External indicators – Swollen bole, punk knots, branch stubs, fruiting bodies of fungi

Causes - Injuries –

Frost injury to young plants establish heart rot by *Phellinus caryophylli* – punk knots

Fire injuries establish heart rot by *Hymenochaete rubiginosa*

Management –

Protection of trees from injuries due to frost and fire

Removal of decayed trees during thinning, improvement and selection felling

Lowering of rotation age

Eradication of fruiting bodies of fungi

Heart rot in sal

Phellinus caryophylli

Hymenochaete rubiginosa

Heart rot in sal

Heart rot in sal showing infection courts and punk knots by *Phellinus caryophylli*

White pocket rot - Heart rot in sal by Hymenochaete rubiginosa

b) Sal coppice forests

Decay passes to trees when coppice shoots are retained with heart rot in the stool – limitation of rotation age up to 15 – 20 years

Management

Do not allow coppicing from stools

Allow plants of seedling origin to grow

Heart Rot in Khair (*Acacia catechu*)

- **Heart rot in khair results into loss of heartwood which yields cutch and kattha of commercial value.**
- **Symptoms – hollowness in the trees, openings showing cavities, sapwood remained unaffected so trees appear healthy**
- **Sign / Pathogen – presence of fruiting bodies of *Phellinus badius* along the stems of infected trees at different heights is clear indication of heart rot in khair trees**
- ***Khair* is subjected to various injuries through which *P. badius* infects the trees, which is a wound parasite such as illicit lopping of branches for fodder, seed collection, fire injury, damage to trees due to animals like porcupines, etc.**

Phellinus badius fruiting bodies on khair trees

Heart rotted wood of khair

Management - Freedom from injury to khair will greatly minimise infection due to *P. badius*.

- Sporophores of the fungus which develop readily on affected trees could be easily knocked off, collected and destroyed. This will reduce the inoculum and check spread of the disease.
- *Khair* raised as a pure crop or in admixture with shisham only is more susceptible to attack not only by *P. badius* but also by *G. lucidum* a serious pathogen on *shisham*.
- To minimize the disease it is necessary to raise *khair* in plantations in mixture with many species as practiced in Uttar Pradesh.
- Working Plans should prescribe removal of all diseased trees including those below the exploitable diameter class.

Heart Rot in Coppice Teak

Dry coppice teak

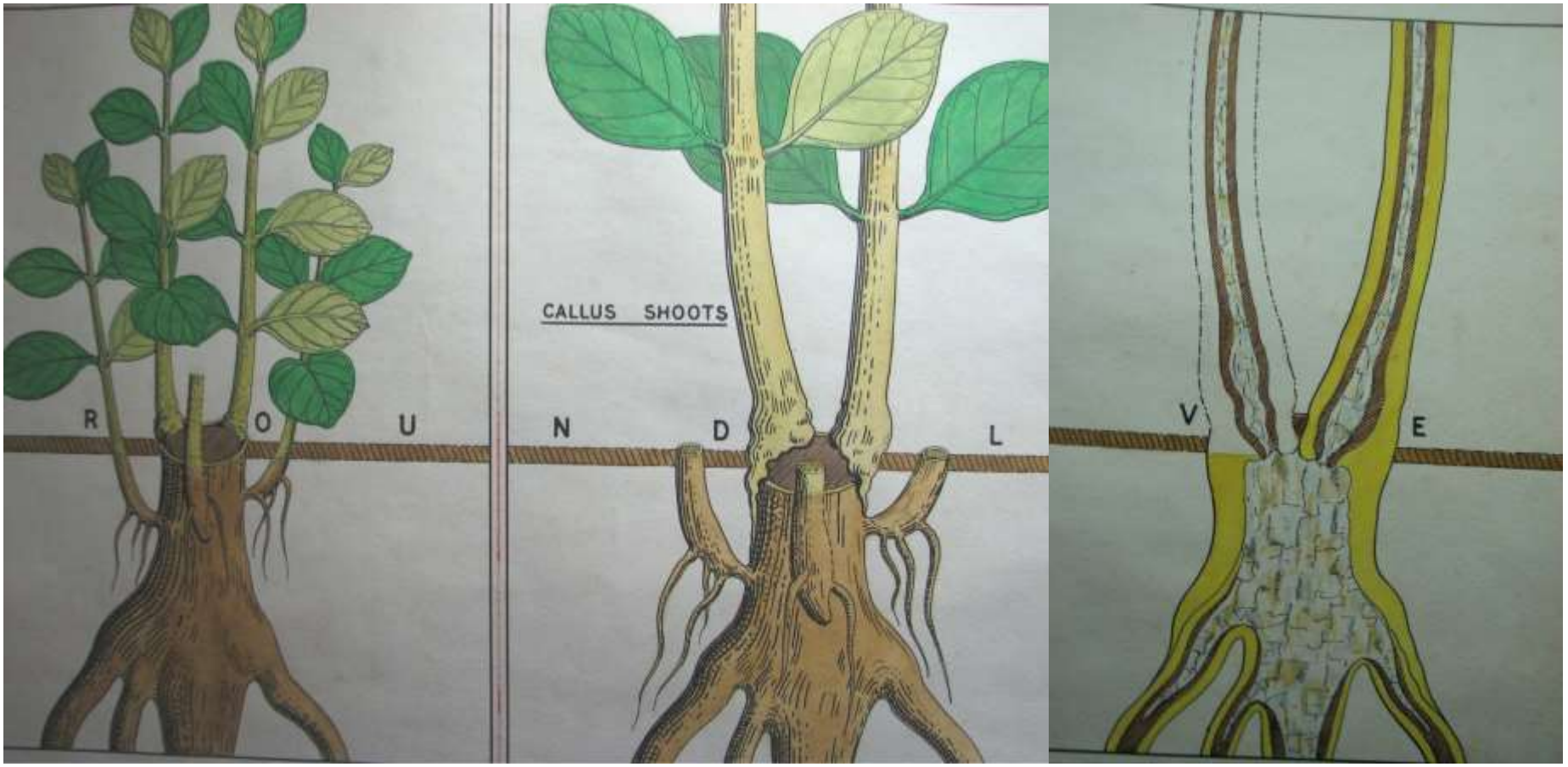
- In dry locations in western parts in Gujarat, teak is worked on a system coppice-with-standard on a rotation of 30 or 48 years.

- At the end of the rotation, trees exhibit unsoundness/ hollowness extending up to 2 – 4 m in the stem.

- The incidence was reported as high as 50 %.

- Trees from high coppice and side shoots develop decay from the stool by *Phellinus lividus* and *Rigidoporus zonalis,* in Gujarat and M.P.

Problem



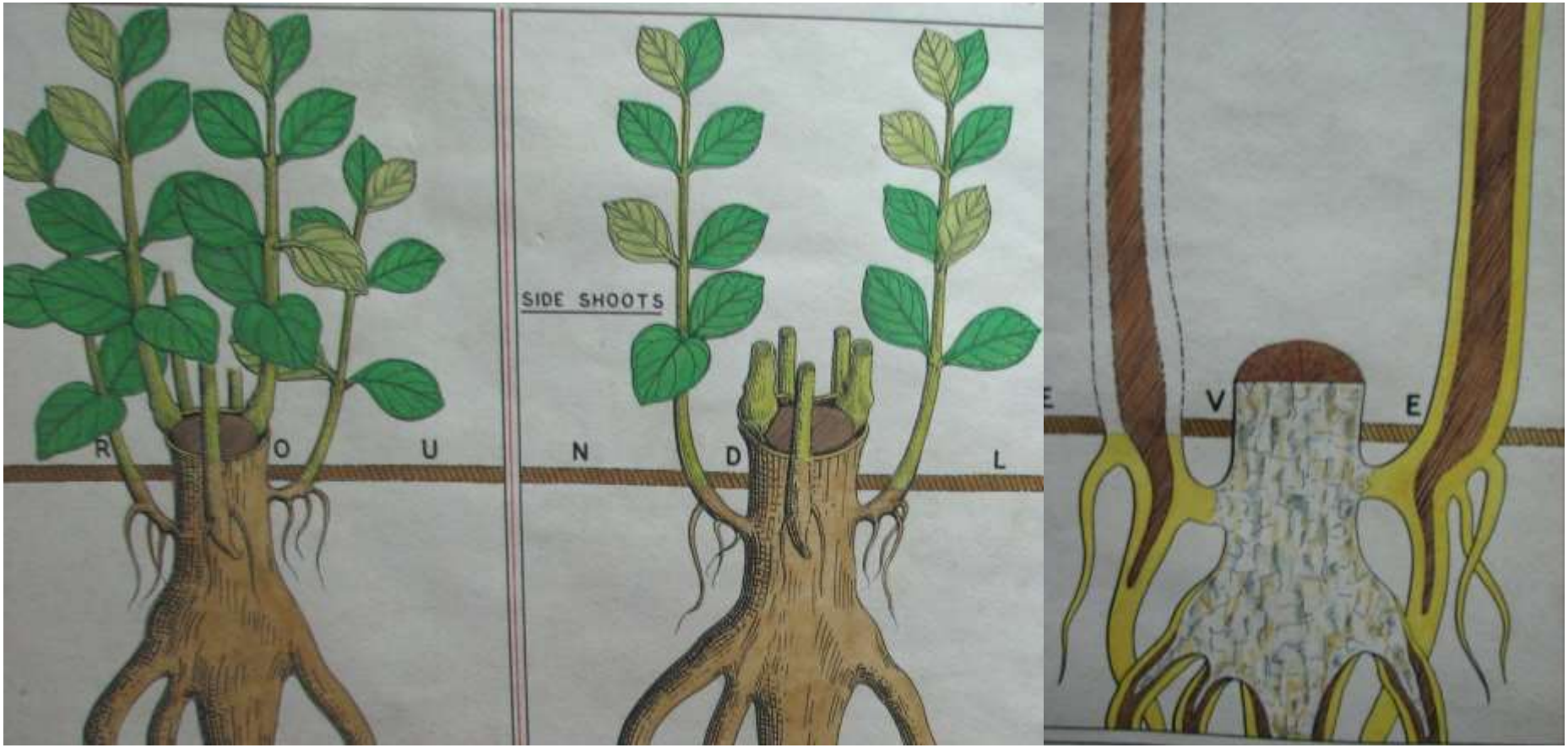
Ground level coppicing, callus shoots encouraged

Cleaning – 2nd year, side shoots removed, callus shoots retained

15th year – 1st thinning, shoots contact decay from stool

Solution

Coppicing height 10 – 15 cm to allow low side shoots which development root system to become independent plant and removal of coppice and high side shoots during cleaning operations



Coppicing 10 – 15 cm above ground level – side shoots encouraged

Cleaning – 2nd year, side shoots retained, callus shoots removed

15th year – 1st thinning, shoots develop independent root system, do not contact decay from stool

Callus shoots

Side shoots

Chir Pine Rust

Chir pine blister rust

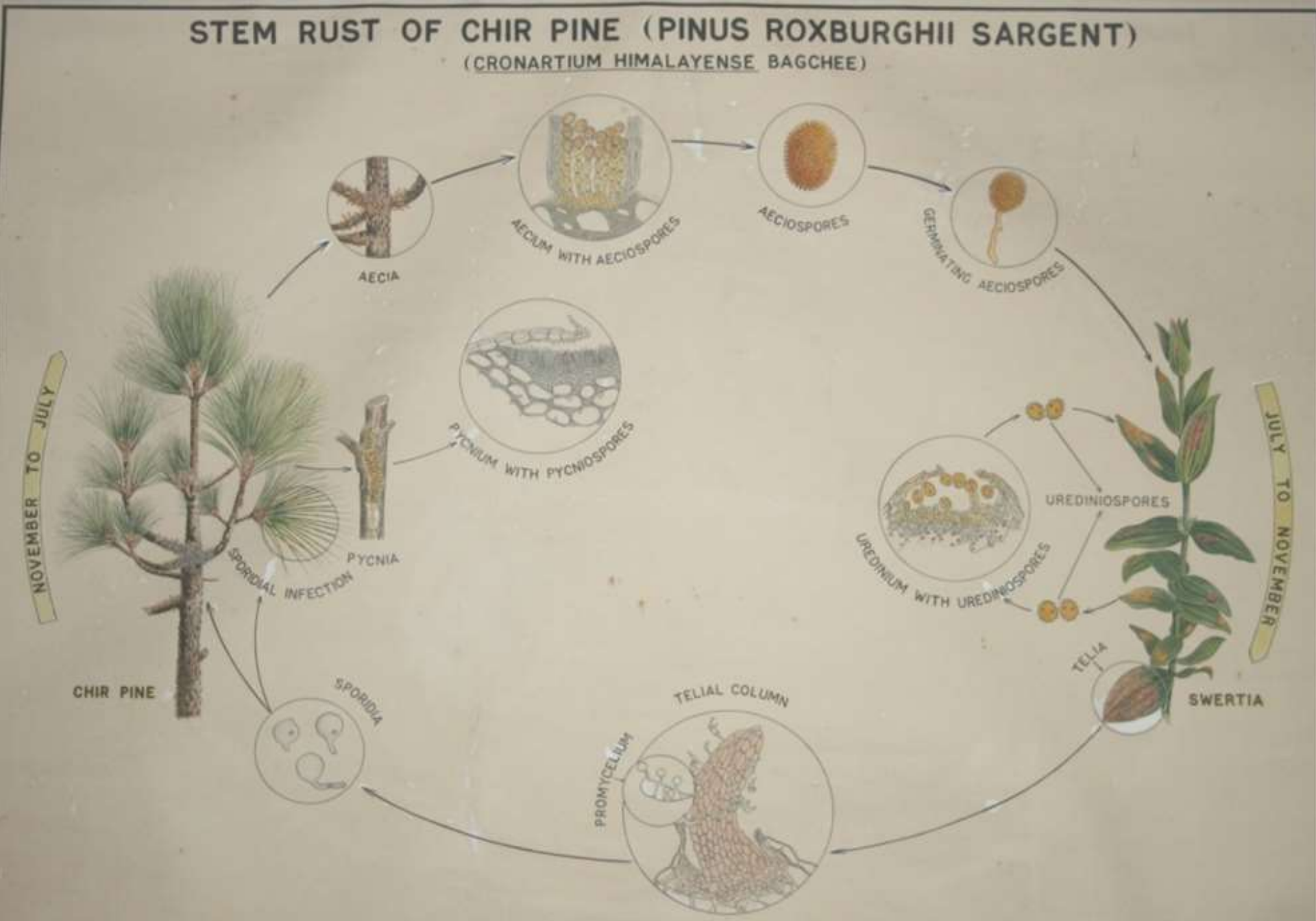
- **Caused heavy mortality in 1920s to 1940s in Kumaun and Garhwal Himalayas**
- **Caused by *Cronartium himalayense***
- **Declined due to natural selection of resistant individuals**

Management–

- **eradication of alternate host, *Swertia* spp. in the vicinity**

STEM RUST OF CHIR PINE (PINUS ROXBURGHII SARGENT)

(CRONARTIUM HIMALAYENSE BAGCHEE)



CONTROL: ① ERADICATE SWERTIA (MECHANCALLY OR BY WEEDICIDES) ② SANITATION ③ BREEDING RESISTANT VARIETIES