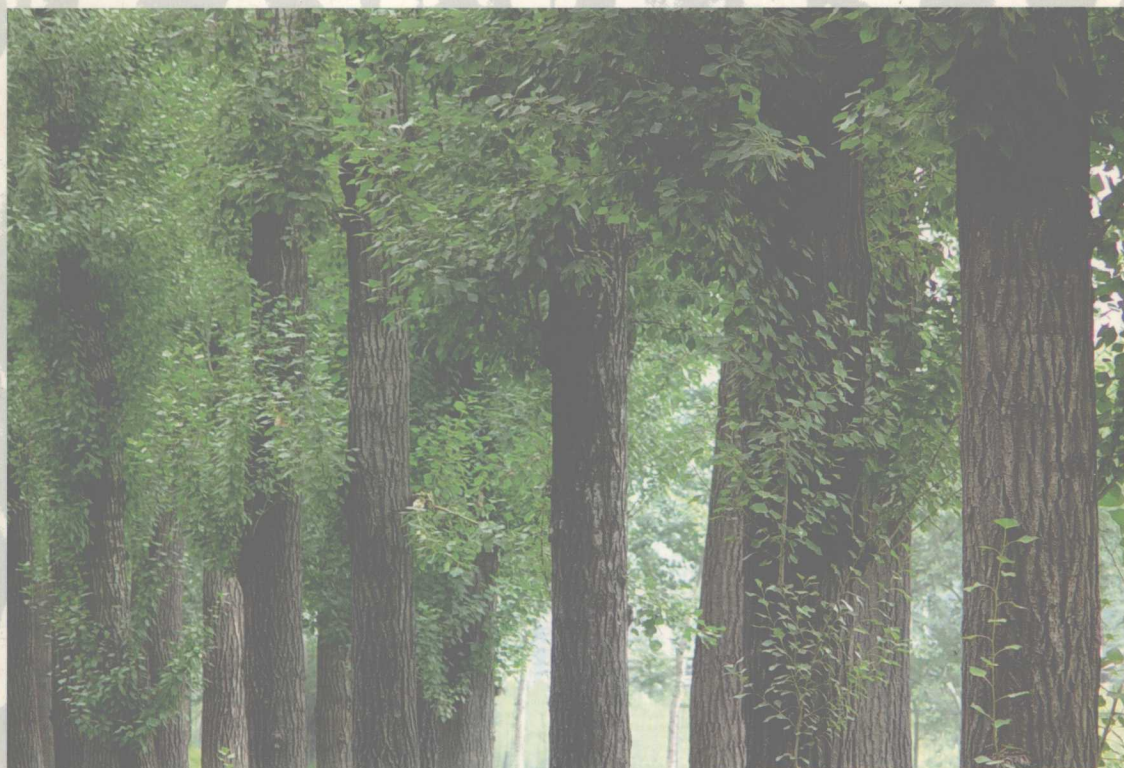


高瑞桐 主编



# 杨树害虫 综合防治研究

Study on the Integrated Control  
of Poplar Pests in China



中国林业出版社

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## 内 容 简 介

本书汇编了自 20 世纪 80 年代以来对杨树害虫的研究报告,总计 72 篇。内容涉及枝干和叶部两类害虫的生物学、预测预报、天敌、防治方法以及害虫危害对杨树生长的影响,杨树对害虫的抗性及产生抗性的原因。可供大专院校、科研单位、生产部门的有关人员参考应用。

### Abstract

This is a compilation of the research papers on poplar pests; the papers totaled 72. It consists of the bionomics, forecast, natural enemies and control methods of the branch and twig and leaf pests. It also contains the effect of damage on the growth of the tree and the resistance of the tree to the pests, and why the resistance is produced. This book is a suitable reference for the related member of the college, research institute and production unit.

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## 前 言

杨树是一种速生树种，在温暖、湿润的气候和肥沃的土壤条件下，其生长速度之快，可以达到“三年成檩，五年成梁”。杨树的木材比重轻，质地洁白，是制作胶合板、火柴杆、刨花板、纤维板、纸浆和包装箱等的好原料，对缓解我国的木材短缺有重要作用。另外，杨树的品种繁多，容易扦插繁殖，造林成活率高，适应性强，因此，从大兴安岭到云贵高原，从黄海滩涂到新疆绿洲，都有不同品种的杨树生长。在村边、路旁，它为行人庇荫；在一望无际的平川，它结成防护林网，形成有利的小气候，为庄稼丰收作屏障，所以人们喜爱杨树。

但是，自1980年以来，光肩星天牛 (*Anoplophora glabripennis* (Motsch.)) 在我国三北地区发生严重，危害性大。驰名中外的三北防护林工程，由于遭受天牛危害，自1991年以来，仅宁夏自治区就砍伐有虫木8000余万株，由于这些树木已千疮百孔，完全失去利用价值，只好烧毁，造成直接经济损失数亿元。同时还使西北的生态环境受到严重破坏。桑天牛 (*Apriona germari* (Hope)) 和云斑天牛 (*Batocera horsfieldi* (Hope)) 在长江中下游地区和华北地区的杨树林和苹果园、核桃园内危害严重，造成果品减产，使农民蒙受巨大的经济损失。另外，由于天牛幼虫钻入树干形成虫孔，不仅使幼树发生风折，大树发生枯梢，严重时还会造成整株死亡，降低树木的寿命，影响生态效益的发挥。同时虫孔太多会使木材失去使用价值，根据中华人民共和国国家标准 (GB144.3—84) 对木材缺陷等级规定，加工用原木在任1米长度范围内，一等材料无虫孔 (虫孔大小为3mm)，二等材料5个虫孔，三等材料6个以上虫孔。其木材等级的差价为：一等材料比二等材料高约25%，一等材料比三等材料高约46%。因此，无论对防护林还是对工业用材林及经济林来说，加强对天牛害虫的防治都是非常必要的。

在杨树人工林内，杨扇舟蛾 (*Clostera anachoreta* (Fabricius))、杨小舟蛾 (*Micromelalopha troglodyta* (Graeser)) 等食叶害虫常吃光叶片，减少叶面积，降低光合作用产物，对树木生长影响极大。研究表明，当7月份杨树失去叶子75%~100%时，可使当年径生长降低21.1%~5.8%，高生长降低20.5%~44.7%，失去叶片50%以下时对当年生长无影响。如果秋季失去叶片100%，虽然对当年生长无影响，而第2年的生长量会降低30%~50%，原因是影响树木越冬的营养储备。近年来杨小舟蛾在北京、湖北、河南，春尺蛾 (*Apocheima cinerarius* Erschoff) 在北京、新疆、内蒙古、江苏等地发生严重。另外，其他一些食叶害虫在某些省区也不断猖獗，对杨树丰产林和农田防护林都造成了极大的危害。

随着杨树人工林面积的逐渐扩大，杨树害虫的防治任务也将日益繁重。为了提高对杨树害虫的管理水平，增强对杨树林内昆虫区系及有益生物的认识，达到使杨树、害虫、天敌及有益生物在林内协调共处，确保杨树林不致因害虫危害而减产，为此，特将20多年来适用的

研究成果编成这本书，希望广大读者能从本书中吸收防治害虫的有效方法，达到增产的目的。本书共收集 72 篇文章，其中包括论文和综述，系统阐述了害虫危害对杨树生长造成的影响、害虫的预测预报、害虫的生物学及防治方法、杨树对害虫的抗性及产生抗性的原因和杨树害虫的天敌及利用。

由于作者水平有限，难免有不妥或错误之处，敬请读者随时提出宝贵意见。

高瑞桐

2003 年 6 月

## Preface

Poplar is a fast-growing species. When a poplar grows in temperate and humidity soil condition, it grows very fast as the going says three-year-old poplar timber could be used as horizontal beam in roof and 5-year-old poplar timber could be used as roof beam. Poplar timber is light density and white, it is a good resources for plywood, march stick, particle board, fiber board, paper pulp, wrapping box, it plays an important role in solving the shortage of timber in China. There are many varieties of poplar and poplar is easy growing when it is breed by cutting, it is a high survival rate and high adapity. Therefore various poplar trees could be seen from Heilongjiang Province to Yungui plateau, from Huanghai beach to green land in Xinjiang. Poplar can grow in the edge of village and along the street and provide shade for passengers. It can also grow in a large area, and develop into shelterbelt and forest net. A mini climate is formed and it acts as a good protector for crop. That is the reason why poplar is welcome by people.

But in the past 3 years, *Anoplophora glabripennis* (Motsch) disaster has taken place seriously in the Three-North region. The Longhorn beetles heavily injure the famous three-north shelterbelt project. Since 1991, more than 8000 poplar trees have been cut for the pest damage in Ningxia, the trees is so heavily injured that they have to be burned out without any utilization value. That causes a loss of 10 million yuan directly in economic aspect. And the ecological environment is also greatly influenced. *Apriona germari* (Hope) and *Batocera horsfieldi* (Hope) exist in poplar forest and apple orchard and peach-pit orchard in lower beach of the Changjiang River and North China, they cause fruit yield to drop down, and farmers have a great loss economically. Additionally, due to penetration of the larvae into trees and the formation of pest hole, the young trees are broken with strong wind. In the meantime the adult trees are withered and dead in extreme cases. The life of trees and ecological performance are reduced. Meanwhile, too many pestholes reduce the utilization value. As defined in National Standard of People's Republic of China (GB144. 3-84), the 1<sup>st</sup> class of timber for processing should be pest hole free in a 1-meter-long log (hole diameter is 3mm), the 2<sup>nd</sup> class of timber is 5 pest holes, and the 3<sup>rd</sup> class timber is more than 6 pests holes. Considering the price difference, the 1<sup>st</sup> class timber is 25% higher than the 2<sup>nd</sup> class, and 46% higher than the 3<sup>rd</sup> class. Therefore it is very necessary to emphasis longhorn beetles control in view of shelterbelt, industrial timber and economic forest.

In the poplar plantation, leaf-eating pest of *Clostera anachoreta* (Fabricius) and *Micromelalopha troglodyta* (Graeser) often eat out leaf, so that they decrease leaf area, lower the photosynthesis; have bad effect on tree growing. The research shows that when poplar losses 75-100% leaves in July, the grown diameter will cause growth drop from 21.1-

5.8% to 20.5-44% in the same year. If the leaf losses 50%, there is no bad effect on poplar growth. If leaf losses 100% in autumn, there is no bad effect on poplar in the same year, but the tree's next year's growth will drop 30-50%, because the tree's overwinter storage is harmed. In recent year Fabricius has taken place heavily in Beijing, Hubei, Henan, and *Apocheima cinerarium* Erschoff has taken place heavily in Beijing, Xinjiang, Inner Mongolia and Jiangsu. In addition, some leaf eater insects are rampant; they greatly harmed poplar high yield plantation and farmland shelterbelt.

The larger the poplar plantation area is, the heavier the poplar pest control task is. The book is composed in order to improve control of poplar pest, acknowledge to insect system and beneficial living things inside poplar plantation and reach a harmony of poplar, pest, natural enemy and beneficial living things inside poplar plantation, the yield of poplar plantation does not drop even if it is injured by poplar insect. We hope the readers could learn effective method for growth yield of poplar from the book. There are 72 articles, including essays and reviews. The book systematically declare pest's bad effect on poplar growth, pest forecast, pest biology and pest control, poplar's resistance to pest and the reason of resistance producing, and utilization of natural enemy.

Gao Ruitong

June, 2003

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# 害虫危害对树木的影响

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Pests damaged effect on tree

# 光肩星天牛危害对杨树损失的研究

光肩星天牛 (*Anoplophora glabripennis* (Motsch.)) 是杨、柳、榆等多种林木的重要蛀性害虫,在我国大部分省区均有分布。自 50 年代以来,许多科技工作者对其生物学及防治问题都作过研究,但对其危害造成的损失研究甚少。随着栽培措施的改革、树种良种化及速效肥料的广泛应用,作物对虫害的超越补偿作用越来越被人们所接受,因此大大提高了防治害虫的经济阈值。本文就光肩星天牛危害对杨树生长影响及对木材质量影响等问题作了系统研究。

## 1 试验地自然概况

试验地设在河南省开封县杏花营和山东省莒县廿里铺。杏花营地处 114°21'E, 34°79'N。年平均气温 14.0℃ (−16.0~42.9℃), 10℃ 以上活动积温 4611.2℃, 年平均相对湿度 69%, 平均年降水量 634.2mm, 主要集中在 6~8 月份, 无霜期约 224 d, 平均全年日照 2266.6 h。土壤为落沙土。廿里铺地处 118°50'E, 35°35'N。年平均气温 12.1℃ (−20.0~39.4℃), 10℃ 以上活动积温 4081.5℃, 年平均相对湿度 71%, 平均年降水量 850mm, 主要集中在 6~8 月份, 无霜期约 187 d, 平均全年日照 2598 h。土壤为河流冲积沙壤土。

## 2 材料与方法

试验树种, 沙兰杨 (*Populus × euramericana* (Dode) Guinier cv. Sacrau-79)、大关杨 (*P. × dokuanensis* Hsu)、泰青杨 (*P. × xiaozhuanica* W.Y. Hsu et Liang cv. Balizhuangyang), 试验用昆虫为光肩星天牛成虫。

### 2.1 人工接种和人工模拟

试验在杏花营进行, 试材为沙兰杨, 1986 年春带杆栽植 1 年生苗, 株行距为 3m×4m。

2.1.1 试验设计 试验设 6 个处理水平, 即每株树上有 1、3、5、7、9 头虫危害, 以无虫的为对照, 每一处理为 1 株树, 重复 6 次, 拉丁方排列。

2.1.2 人工接种与模拟 1987 年 6 月下旬在 2 年生树干基部套高 1m、直径约 17 cm 的铁纱笼, 放入光肩星天牛雌雄成虫 1 对, 任其产卵。8 月下旬检查每株树上的卵槽数及存活的幼虫数, 根据排粪情况对虫数少的人工接幼虫加以补足。1988 年 6 月中旬, 由于幼虫仍未存活, 改为人工打孔模拟危害。其方法是, 在树干上用刀挖长约 8 cm、宽约 4 cm 的长方形疤, 用铁钻在疤上钻一直径 1.2 cm、深约 5 cm 的孔直至 1990 年连续 3 年, 每年 1 次, 年终树木停止生长后测量每株树的生长量。

### 2.2 树体解剖

试验在杏花营和二十里铺进行, 试材为大关杨和泰青杨。1988 年春对 16 年生的行道树按被害轻、中、重三级选出标准树, 砍伐后截成长 1m 的木段, 剖开检查记载每段内的虫道数。