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植物保护—研究报告

瑞香狼毒中3种杀螨活性成分的致死规律

梁为[1],师光禄[2],成军[3],卜春亚[3],靳永胜[4],王有年[5],王战全[6]

1. 北京林业大学
2. 北京农学院
3. 北京农学院，农业部都市农业（北方）重点开放实验室
4. 农业部都市农业（北方）重点开放实验室
5. 农业部都市农业（北方）重点开放实验室；北京农学院植物科学技术学院
6. 平谷区马昌营镇人民政府

摘要：

采用机率值分析方法处理生物测定数据已有半个世纪的历史，但机率分析存在时间效应与浓度效应相互排斥的缺陷，因此将逐步被TDM模型分析法取代。本研究通过TDM模型和3种S型生长模拟模型，对瑞香狼毒中角鲨烯、β-谷甾醇和东莨菪内酯对朱砂叶螨的触杀活性进行研究。结果表明：不同物质的杀螨率对浓度变化的敏感程度为：东莨菪内酯＞β-谷甾醇＞角鲨烯。不同活性物质达到快速死亡期的时间分别为：β-谷甾醇第12 h，角鲨烯第6 h，东莨菪内酯第2 h；由TDM模型估计的理论死亡高峰期与试验观察相吻合；由TDM模型估计的不同活性物质LC50值分别为：角鲨烯13.101 mg/mL，β-谷甾醇9.288 mg/mL，东莨菪内酯1.318 mg/mL，分别为机率值法计算所得LC50值的1.321、1.110、1.040倍。本研究中，东莨菪内酯（1.5 mg/mL）致死中时LT50值最小，为2.237 h，角鲨烯（16 mg/mL）LT50值最大，为7.395 h。各活性物质在最高试验设计浓度下，采用Gompertz和Logistic模型均能较好地拟合朱砂叶螨死亡时间的分布。其中，Logistic模型的拟合效果最好。对Logistic模型参数分析可知，试验中3种物质对朱砂叶螨均具有较好地防治效果；3种杀螨物质中，东莨菪内酯起效时间最快，作用周期较短；β-谷甾醇起效时间最慢，作用周期最长。

关键词： S型生长模型

Study on Mortality Law of Three Kinds of Acaricidal Active Ingredients Extracted from Stellera chamaejasme L.

Abstract:

The probit analysis which had used for half a century, has been taken place by TDM model investigation in bioactivity assay as a neglect of dose and time dependent manner. The TDM model and growth curve of S-type model were introduced to analyze contact toxicity of squalene, β-sitosterol and scopoletin, which were extracted from the roots of Stellera chamaejasme, against Tetranychus cinnabarinus. The results showed that the order of sensitive degree to concentration of different active substrates was scopoletin>β-sitosterol>squalene. Each acaricidal substances reached rapidly mortality periods were that β-sitosterol 12 h, squalene 6 h and scopoletin 2 h. The theoretical periods of rapidly mortality were equal to observed value. The LC50 values of different substances analyzed by TDM model was squalene 13.101 mg/mL, 9.288 mg/mL, and scopoletin 1.318 mg/mL, which were 1.321, 1.110, 1.040 times as LC50 value calculated by probit analysis, respectively. The LT50 value of scopoletin (2.237 h) was the minimum, and squalene (7.395 h) was the maximum in this study. Both Gompertz and Logistic model had fitting effects to the changes of mortality in the maximum concentrations of experiment design, and the Logistic model had the best fitness. The preliminary conclusions were that all of acaricidal substances in this research had significant control effects, and the onset time of scopoletin treatment was the earliest and the theoretical effective period against Tetranychus cinnabarinus was the shortest, while the onset time of β-sitosterol were the latest and the effective period was the longest.

Keywords: growth curve of S-type model

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通讯作者: 王有年

作者简介:

作者Email: wyn1951@126.com

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