

论文

茶叶霜冻气象指数保险设计

娄伟平¹, 吉宗伟², 邱新法³, 吴利红⁴, 何孝笑¹

1. 新昌县气象局, 浙江 新昌 312500;
2. 绍兴市气象局, 浙江 绍兴 312000;
3. 南京信息工程大学, 南京 21004;
4. 浙江省气候中心, 杭州 310017

摘要:

根据茶叶基地历年茶叶逐日经济产出, 确定茶叶进入开采期或开采期前遭受霜冻的经济损失率与最低气温的关系。利用支持向量机将位于各乡镇、街道的中尺度自动气象站的最低气温资料延长到30 a; 最低气温和茶叶经济损失率相对应, 因此通过根据最低气温资料计算不同等级霜冻出现风险确定茶叶经济损失风险, 解决了茶叶品种种植时间短、中尺度自动气象站资料积累时间短, 不能满足风险分析要求的问题。利用多种风险分析模型拟合分析各乡镇、街道茶叶处于不同开采期时的最低气温分布, 从中选择最优的理论概率分布函数进行序列的风险概率估算, 得到较为稳定并符合实际的风险评估结果。在风险定量分析基础上, 从浙江省政策性农业保险经营的实际需要出发, 综合区域产量保险和气象指数保险的优点, 设计了精细化到乡镇一级的茶叶霜冻气象指数保险, 降低了农业保险中存在的基差风险、逆选择和道德风险, 在灾后理赔时不需要大量的人力、物力勘查定损, 理赔时效高、理赔成本低, 为开展茶叶政策性农业保险提供技术支撑。

关键词: 茶叶 农业保险 霜冻 气象指数保险

Design of Weather Index Insurance Contract for Tea Frost

LOU Wei-ping¹, JI Zong-wei², QIU Xin-fa³, WU Li-hong⁴, HE Xiao-xiao¹

1. Xinchang Weather Bureau, Xinchang 312500, China;
2. Shaoxing Weather Bureau, Shaoxing 312000, China;
3. Nanjing University of Information Science & Technology, Nanjing 21004;
4. Zhejiang Provincial Climate Center, Hangzhou 310017, China

Abstract:

This paper takes tea production in Xinchang County of Zhejiang as an example, under the principle of disaster risk analysis and requirement for agricultural insurance, combined with characteristics such as huge topographic relief and significant difference in microclimate in southern mountain area of China, carries out risk evaluation and agricultural insurance product design through elaborating frost disaster which affected tea production in March at village & township level. Firstly, the paper confirms tea's economic output changes from time to time in productive life based on tea's daily economic output in normal years of tea planting base; combined with economic loss rate due to frost during/before productive life in previous years to confirm frost weather index—minimum temperature in a period before productive life or after productive life, different minimum temperature is in accordance with tea's economic loss rate. Support Vector Machine (SVM) is used to extend mesoscale automatic weather station's minimum temperature data to 30 years in specific to non-linear relation existing among meteorological data of mesoscale automatic weather station in villages, towns and county; minimum temperature corresponds to tea's economic loss rate, therefore it's possible to calculate different levels of frost risk based on minimum temperature data and confirm tea's economic loss risk, and to solve problems such as tea's short planting period, short accumulation period for mesoscale automatic weather stations and unable to meet risk analysis requirement. There're certain differences between risk results calculated on different risk analysis models. The article applies probability density function fitting distributions such as Beta, Exponential, Gumbel, Gamma, Generalized Extreme Value, Inverse Gaussian, Logistic, Log-Logistic, Lognormal, Lognormal2, Normal, Pareto, Pareto2, Pearson Type V, Pearson Type VI, Student, Weibull to minimum temperature data sequence in every township and street in the study area. Parameter estimation in distribution model applies maximum likelihood method, both of Anderson-Darling and Kolmogorov-Smirnov examination selected from different production periods in different townships and villages passed significance level of 0.05. Almost coincidence distribution of P-P drawing's tailer and diagonal line confirms that Generalized Extreme Value distribution's risk probability estimation as the best theoretical probability distribution function, thus being relatively stable with realistic risk evaluation result. On the basis of quantitative risk analysis

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and considering actual needs of policy-based agricultural insurance operation, combined with advantages of regional output insurance and weather index, the paper designs tea's frost weather index insurance. It is to confirm insurance rate and compensation agreement in a pre-designated area on the basis of frost caused economic loss rate and occurrence risk in the case that frost happens during tea's production life. Tea's frost weather index is weather index corresponds to pre-determined frost meteorological event, every index value corresponds with certain tea economic loss rate and claim ratio. This paper suggests to carry out compensation according to frost weather index confirmed by meteorological data observed by mesoscale automatic weather stations in every township, village and street, compensation index for rural household and insurance company is measured by representative weather stations closest to rural households, therefore basis risks, adverse selection and moral risk are reduced. And there is no need to use huge human and non-human sources to inspect and judge losses in claim settlement after disaster, and the claim settlement efficiency is high but the claim settlement cost is low, hence this is a positive and effective technological measure to carry out tea insurance and promote sustainable development of agricultural insurance.

Keywords: tea agricultural insurance frost weather index insurance

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通讯作者:

作者简介:

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