

郭予元院士在植物保护数理统计学上的学术贡献

90

周益林，聂晓，刘伟，范洁茹，梁革梅，陆宴辉

(，100193)

50，20，60，20，50，80，435.122，A DOI 10.16688/j.zwbh.2022701

Contributions of Academician Guo Yuyuan in the mathematical statistics of plant protection

—To commemorate the 90th anniversary of the birth of Academician Guo Yuyuan

ZHOU Yilin，NIE Xiao，LIU Wei，FAN Jieru，LIANG Gemei，LU Yanhui

(，100193，)

Abstract Mathematical statistics as a highly practical discipline has been widely used in various fields of society, and is also very important in plant protection discipline. Academician Guo Yuyuan, who is one of the pioneers in applying mathematical statistics in plant protection, especially in the monitoring and prediction of plant diseases and insect pests has done a lot of work since the mid-1950s, including the theory and methods of mathematical statistics, application in plant protection, and education popularization of mathematical statistics. In this paper, the main contributions of Academician Guo in mathematical statistics were reviewed. In the aspects of theory and methods of mathematical statistics, since the 1960s, Academician Guo creatively proposed the compact calculation method for correlation and regression analysis, and the restoration table of orthogonal polynomial coefficients, and developed coding programs which covering almost all mathematical statistical methods or models commonly

20 80 , 、
 Casio fx-180p, Casio fx-3600p
 (1983)
 (Casio fx-120)
 ,
 ,

1 min
 [7]。

Casio fx-180p, Casio fx-3600p

Casio fx-180p

LD₅₀ , Leslie
 K
 , 3~5
 (, , ,)
 A , -) ,

38

1
 (Abraham De Moivre) 1733

Gauss

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right)$$

π , μ , σ^2 ,

x μ, σ^2
 (Gauss) 。
 Casio fx-180p μ, σ^2 : 1 Kin 1 Kin 6 INV Min
 MODE 0 INV PCL P₁ Kout 1 (MR 2 π) INV
 $\sqrt{\quad}$ INV $\frac{1}{x}$ (2 INV $\frac{1}{x}$ ((ENT-Kout 6) INV
 $x^2 \div$ MR)) +/− INV e^x = INV HLT INV RTN
 MODE • σ^2 INV Min μ Kin 6 P₁ r RUN $f(x)$
 RUN r RUN 。

2 18 19

(Dirichlet) 、 T

$f(x)$,

() :

$$y = f(x) = a_0 + \sum_{r=1}^L (a_r \cos rx + b_r \sin rx)$$

$f(x)$, a_0 , r

, a_r b_r , L

, x 。

$$a_r = y_m \cos \frac{2\pi m}{n}$$

$$b_r = y_m \sin \frac{2\pi m}{n}$$

$$T_r = \frac{2\pi m}{r}, m, n$$

x 。

Casio fx-180p a_0, a_r, b_r : 1 Kin 5 MODE 0 INV
 PCL P₁ Kout 6 M+ MR sin ENT Kin+3 Kin 4=Kin
 +1 MR cos Kout 4=Kin+2 INV RTN INV P₂ Kout
 5 $\div \div$ Kout 2 = INV HLT Kout 1 = MODE • INV
 KAC INV Min $2\pi m/n$ Kin 6 INV M−n Kin 5 P₁ y_1
 RUN y_2 RUN AC INV P₂ a_r RUN b_r Kout 3
 \div N a_0 。

Casio fx-180p \hat{y}_m : MODE 0 INV
 PCL P₁ Kout 6 Kin+3 ENT Kout 3 cos+ENT
 Kout 3 sin M+ INV RTN MODE • $\frac{2\pi m}{n}$ Kin 6 +/−
 Kin 3 a_0 INV Min P₁ a_r RUN b_r RUNMR \hat{y}_m 。

“ ”

“ ”

2.2

20 80

3.1

20 80

[15]。1988

4

—《 》,

7 20

4

[16]。

1994

“206”

(

《

)

Tetranychus cinnabarinus

T. truncatus

)

[17]。

1991 —1994

[18]。

1989

(: *Blumeria graminis* f. sp.

3

tritici)

Casio fx-3600p, Casio fx-180p

《

》《

》

。

《

》

P-E

(

、Gompertz

(

4

Aphis gossypii

1986

《 》《

》

6 10 100

Agrotis segetum、

()

Caradrina auguroides、

Bt

Lygus pratensis 5

(、)

[20-22]

2008

3.2

《 》

[23]

10

Bt

《 》

Bt

[1] . . [J]. , 1991(4): 37 - 38.

[2] . [J]. , 1965, 9(6): 372 - 377.

[3] . [J]. , 1985(1): 39 - 40.

[4] HOTELLING H. Statistical tables for biological, agricultural and medical research by R. A. Fisher [J]. Science, 1938, 88(2295): 596 - 597.

[5] . [J]. , 1981, 7(3): 40 - 42.

[6] . () [J]. , 1981, 7(4): 35 - 36.

[7] . [J]. , 1983(3): 46 - 47.

[8] . [J]. , 1962, 1(2): 1.

[9] , . [J]. , 1988(4): 11 - 12.

[10] , , . [J]. , 1987, 14(4): 241 - 245.

[11] , , . [J]. , 1986, 12(4): 12 - 14.

[12] , , . [J]. , 1989, 16(4): 239 - 243.

[13] , , . [J]. , 1991, 18(3): 199 - 206.

[14] , , . [J]. , 1994, 21(1): 7 - 13.

[15] , , . [J]. , 1985, 12(4): 261 - 268.

[16] , , . [J]. , 1988, 14(3): 2 - 5.

[17] , , . [J]. , 1994, 21(4): 339 - 344.

[18] , , . [J]. , 1995, 21(1): 26 - 28.

[19] , , . [J]. , 1989, 15(1): 42 - 44.

[20] , , . [J]. , 1988(1): 28 - 30.

[21] . [J]. , 1988(1): 54 - 55.

[22] , , . [J]. , 1989, 15(5): 15 - 16.

[23] WU Kongming, LU Yanhui, FENG Hongqiang, et al. Suppression of cotton bollworm in multiple crops in China in areas with Bt toxin-containing cotton [J]. Science, 2008, 321(5986): 1676 - 1678.

[24] LU Yanhui, WU Kongming, JIANG Yuying, et al. Mirid bug outbreaks in multiple crops correlated with wide-scale adoption of Bt cotton in China [J]. Science, 2010, 328(5982): 1151 - 1154.

[25] LU Yanhui, WU Kongming, JIANG Yuying, et al. Wide-spread adoption of Bt cotton and insecticide decrease promotes biocontrol services [J]. Nature, 2012, 487(7407): 362 - 365.