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**Información suplementaria**

**Assessment of the level of adjustment of three epidemiological models in the analysis of epidemics with incidences less than 100% such as the lethal wilt of oil palm (*Elaeis guineensis* Jacq.)**

Evaluación del nivel de ajuste de tres modelos epidemiológicos en el análisis de epidemias con incidencias inferiores al 100% como la marchitez letal de la palma de aceite (*Elaeis guineensis* Jacq.)

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 **Table S1.** Linear regression analysis of the three growth models assessed at different asymptotes or maximum disease incidence (*Kmax*) of the records, corresponding to plot 1.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Kmax*** | ***Model*** | ***F-test values*** | ***Coefficients*** | ***Estimates*** | ***Asymptotic standard error*** | ***95% confidence interval*** |
| ***Lower limit*** | ***Upper limit*** |
| 1.00 | Monomolecular | 1431.289674\*\* | $$y\_{0}1$$ | **0.002964367** | **0.00937395** | **-0.016085792** | **0.022014526** |
| $$r\_{L}2$$ | **0.016714745** | **0.00044181** | **0.015816878** | **0.017612612** |
| Logistic | 137.0899723\*\* | $$y\_{0}$$ | -3.071511341 | 0.170775253 | -3.418568411 | -2.724454272 |
| $$r\_{L}$$ | 0.094241267 | 0.008048932 | 0.077883868 | 0.110598665 |
| Gompertz | 287.6131306\*\* | $$y\_{0}$$ | -1.166184266 | 0.053913631 | -1.275749946 | -1.056618586 |
| $$r\_{G}$$ | 0.043093946 | 0.002541042 | 0.037929927 | 0.048257966 |
| 0.90 | Monomolecular | 1592.141953\*\* | $$y\_{0}$$ | **-0.001213765** | **0.010282748** | **-0.022110823** | **0.019683292** |
| $$r\_{M}$$ | **0.019338082** | **0.000484644** | **0.018353168** | **0.020322997** |
| Logistic | 144.3529399\*\* | $$y\_{0}$$ | -2.970328958 | 0.171056254 | -3.317957092 | -2.622700825 |
| $$r\_{L}$$ | 0.096864604 | 0.008062176 | 0.080480291 | 0.113248918 |
| Gompertz | 314.7474828\*\* | $$y\_{0}$$ | -1.140740639 | 0.055334719 | -1.253194318 | -1.028286959 |
| $$r\_{G}$$ | 0.04626922 | 0.002608021 | 0.040969084 | 0.051569356 |
| 0.80 | Monomolecular | 1849.576541\*\* | $$y\_{0}$$ | **-0.008801132** | **0.011332039** | **-0.031830605** | **0.014228341** |
| $$r\_{M}$$ | **0.022969817** | **0.000534099** | **0.021884398** | **0.024055236** |
| Logistic | 155.2194211\*\* | $$y\_{0}$$ | -2.86013329 | 0.171144866 | -3.207941504 | -2.512325075 |
| $$r\_{L}$$ | 0.100496339 | 0.008066353 | 0.084103537 | 0.11688914 |
| Gompertz | 356.6970165\*\* | $$y\_{0}$$ | -1.114460287 | 0.05676486 | -1.229820361 | -0.999100212 |
| $$r\_{G}$$ | 0.050529225 | 0.002675426 | 0.045092106 | 0.055966345 |
| 0.70 | Monomolecular | 2311.470577\*\* | $$y\_{0}$$ | **-0.023695011** | **0.012517306** | **-0.049133236** | **0.001743215** |
| $$r\_{M}$$ | **0.028364059** | **0.000589962** | **0.027165111** | **0.029563006** |
| Logistic | 173.3400131\*\* | $$y\_{0}$$ | -2.741495776 | 0.170645399 | -3.088288951 | -2.394702601 |
| $$r\_{L}$$ | 0.10589058 | 0.008042812 | 0.08954562 | 0.122235541 |
| Gompertz | 431.0485633\*\* | $$y\_{0}$$ | -1.089969759 | 0.057892287 | -1.207621042 | -0.972318476 |
| $$r\_{G}$$ | 0.056649639 | 0.002728563 | 0.051104531 | 0.062194746 |
| 0.60 | Monomolecular | 3219.031038\*\* | $$y\_{0}$$ | **-0.057300601** | **0.013969639** | **-0.085690324** | **-0.028910878** |
| $$r\_{M}$$ | **0.037356064** | **0.000658413** | **0.036018007** | **0.038694121** |
| Logistic | 210.037235\*\* | $$y\_{0}$$ | -2.620950687 | 0.168187116 | -2.962748029 | -2.279153344 |
| $$r\_{L}$$ | 0.114882586 | 0.007926949 | 0.098773087 | 0.130992084 |
| Gompertz | 601.6966461\*\* | $$y\_{0}$$ | -1.076763808 | 0.057517917 | -1.193654278 | -0.959873338 |
| $$r\_{G}$$ | 0.066497494 | 0.002710919 | 0.060988244 | 0.072006743 |
| 0.50 | Monomolecular | 3204.441493\*\* | $$y\_{0}$$ | **-0.159850928** | **0.021151627** | **-0.202836207** | **-0.11686565** |
| $$r\_{M}$$ | **0.05643302** | **0.000996913** | **0.05440705** | **0.05845899** |
| Logistic | 328.764716\*\* | $$y\_{0}$$ | -2.541179457 | 0.156753671 | -2.859741243 | -2.22261767 |
| $$r\_{L}$$ | 0.133959542 | 0.007388071 | 0.118945175 | 0.148973908 |
| Gompertz | 1370.450209\*\* | $$y\_{0}$$ | -1.122023651 | 0.049638712 | -1.22290165 | -1.021145651 |
| $$r\_{G}$$ | 0.086609487 | 0.002339558 | 0.081854933 | 0.091364041 |
| **0.45** | Monomolecular | 1035.195128 | $$y\_{0}$$ | -0.340160856 | 0.053166061 | -0.448207291 | -0.232114421 |
| $$r\_{M}$$ | 0.080622995 | 0.002505808 | 0.07553058 | 0.08571541 |
| Logistic | 624.4921075 | $$y\_{0}$$ | -2.616128869 | 0.134273731 | -2.889005923 | -2.343251816 |
| $$r\_{L}$$ | 0.158149516 | 0.006328553 | 0.14528835 | 0.171010683 |
| Gompertz | 3034.790309\*\* | $$y\_{0}$$ | **-1.268246914** | **0.042908072** | **-1.355446608** | **-1.18104722** |
| $$r\_{G}$$ | **0.111408077** | **0.002022331** | **0.107298205** | **0.115517949** |
| **0.43** | Monomolecular | 365.7086095\*\* | $$y\_{0}$$ | -0.57180627 | 0.116947313 | -0.809471805 | -0.334140735 |
| $$r\_{M}$$ | 0.105407418 | 0.005511929 | 0.094205831 | 0.116609004 |
| Logistic | 968.1729275\*\* | $$y\_{0}$$ | -2.802311908 | 0.12473964 | -3.055813357 | -2.54881046 |
| $$r\_{L}$$ | 0.182933939 | 0.005879194 | 0.170985979 | 0.1948819 |
| Gompertz | 1054.969355\*\* | $$y\_{0}$$ | **-1.484957753** | **0.089138158** | **-1.666108285** | **-1.303807221** |
| $$r\_{G}$$ | **0.136457343** | **0.004201235** | **0.127919406** | **0.14499528** |

*Values in bold indicate coefficients with the highest contribution to the model fit according to the standard asymptotic error test.*

*\*\* Level of significance of 1%.*

*1y0 = disease in proportion in the first observation.*

*2r\* = disease growth rate of a specific model.*

**Table S2.** Linear regression analysis of the three growth models assessed at different asymptotes or maximum disease incidence (*Kmax*) of the records, corresponding to plot 2.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Kmax*** | ***Model*** | ***F-test values*** | ***Coefficients*** | ***Estimates*** | ***Asymptotic standard error*** | ***95% confidence interval*** |
| ***Lower limit*** | ***Upper limit*** |
| 1.00 | Monomolecular | 1011.878966\*\* | $$y\_{0}1$$ | **-0.053902304** | **0.006740292** | **-0.067600226** | **-0.040204383** |
| $$r\_{M}2$$ | **0.010105466** | **0.000317682** | **0.009459859** | **0.010751072** |
| Logistic | 213.335392\*\* | $$y\_{0}$$ | -5.280915097 | 0.207018695 | -5.701627704 | -4.86020249 |
| $$r\_{L}$$ | 0.142512958 | 0.009757148 | 0.122684048 | 0.162341869 |
| Gompertz | 706.3612045\*\* | $$y\_{0}$$ | -1.748302626 | 0.036880859 | -1.823253548 | -1.673351703 |
| $$r\_{G}$$ | 0.04619849 | 0.001738258 | 0.042665923 | 0.049731056 |
| 0.90 | Monomolecular | 973.3251275\*\* | $$y\_{0}$$ | **-0.061705546** | **0.007776283** | **-0.077508855** | **-0.045902237** |
| $$r\_{M}$$ | **0.011434426** | **0.00036651** | **0.010689589** | **0.012179263** |
| Logistic | 219.0220089\*\* | $$y\_{0}$$ | -5.183357822 | 0.2062188 | -5.602444846 | -4.764270798 |
| $$r\_{L}$$ | 0.143841919 | 0.009719448 | 0.124089624 | 0.163594213 |
| Gompertz | 765.2952774\*\* | $$y\_{0}$$ | -1.737125026 | 0.037021309 | -1.812361378 | -1.661888674 |
| $$r\_{G}$$ | 0.048270258 | 0.001744878 | 0.044724239 | 0.051816277 |
| 0.80 | Monomolecular | 924.8831611\*\* | $$y\_{0}$$ | **-0.072136958** | **0.009188389** | **-0.090810011** | **-0.053463905** |
| $$r\_{M}$$ | **0.013170314** | **0.000433065** | **0.012290221** | **0.014050408** |
| Logistic | 226.7604328\*\* | $$y\_{0}$$ | -5.076006199 | 0.205115368 | -5.49285078 | -4.659161619 |
| $$r\_{L}$$ | 0.145577807 | 0.009667441 | 0.125931203 | 0.165224411 |
| Gompertz | 848.2946527\*\* | $$y\_{0}$$ | -1.725906707 | 0.037047591 | -1.80119647 | -1.650616945 |
| $$r\_{G}$$ | 0.050856523 | 0.001746117 | 0.047307987 | 0.054405059 |
| 0.70 | Monomolecular | 862.3267611\*\* | $$y\_{0}$$ | **-0.086788835** | **0.01122602** | **-0.109602853** | **-0.063974817** |
| $$r\_{M}$$ | **0.015537283** | **0.000529102** | **0.014462019** | **0.016612547** |
| Logistic | 237.9151904\*\* | $$y\_{0}$$ | -4.957126683 | 0.203505062 | -5.370698727 | -4.543554639 |
| $$r\_{L}$$ | 0.147944776 | 0.009591545 | 0.128452412 | 0.16743714 |
| Gompertz | 974.3687433\*\* | $$y\_{0}$$ | -1.71544182 | 0.036849267 | -1.790328541 | -1.6405551 |
| $$r\_{G}$$ | 0.054213052 | 0.00173677 | 0.050683512 | 0.057742592 |
| 0.60 | Monomolecular | 778.7326893\*\* | $$y\_{0}$$ | **-0.108867738** | **0.014420052** | **-0.13817281** | **-0.079562667** |
| $$r\_{M}$$ | **0.018965939** | **0.000679642** | **0.017584741** | **0.020347138** |
| Logistic | 255.4185532\*\* | $$y\_{0}$$ | -4.825054907 | 0.200960223 | -5.233455217 | -4.416654597 |
| $$r\_{L}$$ | 0.151373432 | 0.009471602 | 0.132124821 | 0.170622043 |
| Gompertz | 1188.796137\*\* | $$y\_{0}$$ | -1.707734814 | 0.03619429 | -1.78129046 | -1.634179167 |
| $$r\_{G}$$ | 0.058817571 | 0.001705899 | 0.055350766 | 0.062284375 |
| 0.50 | Monomolecular | 662.0494241\*\* | $$y\_{0}$$ | **-0.145964561** | **0.020132144** | **-0.186878** | **-0.105051122** |
| $$r\_{M}$$ | **0.024414541** | **0.000948863** | **0.02248622** | **0.026342862** |
| Logistic | 286.9624571\*\* | $$y\_{0}$$ | -4.679830173 | 0.196417965 | -5.078999503 | -4.280660842 |
| $$r\_{L}$$ | 0.156822034 | 0.009257517 | 0.138008495 | 0.175635573 |
| Gompertz | 1624.725456\*\* | $$y\_{0}$$ | -1.70845102 | 0.034584406 | -1.778734989 | -1.638167051 |
| $$r\_{G}$$ | 0.065702765 | 0.001630023 | 0.06239016 | 0.069015369 |
| **0.40** | Monomolecular | 489.5239552\*\* | $$y\_{0}$$ | -0.221849681 | 0.033212958 | -0.289346533 | -0.154352828 |
| $$r\_{M}$$ | 0.034634416 | 0.001565384 | 0.031453173 | 0.037815659 |
| Logistic | 361.509879\*\* | $$y\_{0}$$ | -4.532571741 | 0.186402626 | -4.911387453 | -4.153756029 |
| $$r\_{L}$$ | 0.167041908 | 0.008785477 | 0.149187671 | 0.184896146 |
| Gompertz | 2718.870235\*\* | $$y\_{0}$$ | **-1.738006264** | **0.031635655** | **-1.802297651** | **-1.673714878** |
| $$r\_{G}$$ | **0.077747137** | **0.001491043** | **0.074716973** | **0.080777301** |
| **0.28** | Monomolecular | 97.77702297\*\* | $$y\_{0}$$ | -0.75450794 | 0.19278383 | -1.146291821 | -0.362724059 |
| $$r\_{M}$$ | 0.089846744 | 0.009086234 | 0.071381294 | 0.108312194 |
| Logistic | 775.7687896\*\* | $$y\_{0}$$ | -4.708555057 | 0.169305304 | -5.052624831 | -4.364485283 |
| $$r\_{L}$$ | 0.222254237 | 0.007979651 | 0.206037635 | 0.238470838 |
| Gompertz | 317.5515829\*\* | $$y\_{0}$$ | **-2.192142651** | **0.16195157** | **-2.521267839** | **-1.863017462** |
| $$r\_{G}$$ | **0.136020897** | **0.007633057** | **0.12050866** | **0.151533135** |

*Values in bold indicate coefficients with the highest contribution to the model fit according to the standard asymptotic error test.*

*\*\* Level of significance of 1%.*

*1y0 = disease in proportion in the first observation.*

*2r\* = disease growth rate of a specific model.*

**Table S3.** Linear regression analysis of the three growth models assessed at different asymptotes or maximum disease incidence (*Kmax*) of the records, corresponding to plot 3.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Kmax*** | ***Model*** | ***F-test values*** | ***Coefficients*** | ***Estimates*** | ***Asymptotic standard error*** | ***95% confidence interval*** |
| ***Lower limit*** | ***Upper limit*** |
| 1.00 | Monomolecular | 1876.458036\*\* | $$y\_{0}1$$ | **-0.035405942** | **0.004207057** | **-0.043955711** | **-0.026856173** |
| $$r\_{M}2$$ | **0.008589368** | **0.000198286** | **0.008186402** | **0.008992333** |
| Logistic | 111.6098686\*\* | $$y\_{0}$$ | -5.296409667 | 0.282329724 | -5.870172699 | -4.722646636 |
| $$r\_{L}$$ | 0.140579254 | 0.013306687 | 0.113536813 | 0.167621696 |
| Gompertz | 305.9106851\*\* | $$y\_{0}$$ | -1.707792134 | 0.052170333 | -1.813815007 | -1.601769261 |
| $$r\_{G}$$ | 0.043006516 | 0.002458878 | 0.038009475 | 0.048003557 |
| 0.90 | Monomolecular | 1816.044606\*\* | $$y\_{0}$$ | **-0.040586245** | **0.004827672** | **-0.050397255** | **-0.030775235** |
| $$r\_{M}$$ | **0.009696485** | **0.000227537** | **0.009234076** | **0.010158895** |
| Logistic | 113.6946655\*\* | $$y\_{0}$$ | -5.196229455 | 0.281932215 | -5.76918465 | -4.62327426 |
| $$r\_{L}$$ | 0.141686372 | 0.013287952 | 0.114682005 | 0.168690739 |
| Gompertz | 323.8524525\*\* | $$y\_{0}$$ | -1.693337769 | 0.052835235 | -1.800711884 | -1.585963654 |
| $$r\_{G}$$ | 0.044813676 | 0.002490216 | 0.039752949 | 0.049874403 |
| 0.80 | Monomolecular | 1738.308406\*\* | $$y\_{0}$$ | **-0.047511448** | **0.005665843** | **-0.059025825** | **-0.03599707** |
| $$r\_{M}$$ | **0.011133745** | **0.000267041** | **0.010591052** | **0.011676437** |
| Logistic | 116.4721195\*\* | $$y\_{0}$$ | -5.085371622 | 0.281375982 | -5.657196417 | -4.513546827 |
| $$r\_{L}$$ | 0.143123631 | 0.013261735 | 0.116172542 | 0.17007472 |
| Gompertz | 347.9764128\*\* | $$y\_{0}$$ | -1.677868186 | 0.053517613 | -1.786629061 | -1.569107311 |
| $$r\_{G}$$ | 0.047052746 | 0.002522377 | 0.041926658 | 0.052178833 |
| 0.70 | Monomolecular | 1635.321939\*\* | $$y\_{0}$$ | **-0.057225229** | **0.006860849** | **-0.071168151** | **-0.043282307** |
| $$r\_{M}$$ | **0.013076539** | **0.000323364** | **0.012419385** | **0.013733693** |
| Logistic | 120.3587261\*\* | $$y\_{0}$$ | -4.96155401 | 0.280552915 | -5.531706131 | -4.391401889 |
| $$r\_{L}$$ | 0.145066425 | 0.013222943 | 0.118194173 | 0.171938678 |
| Gompertz | 382.4145921\*\* | $$y\_{0}$$ | -1.661603466 | 0.054171836 | -1.771693883 | -1.551513049 |
| $$r\_{G}$$ | 0.049929144 | 0.002553212 | 0.044740393 | 0.055117895 |
| 0.60 | Monomolecular | 1494.047434\*\* | $$y\_{0}$$ | **-0.071796969** | **0.008702272** | **-0.089482113** | **-0.054111824** |
| $$r\_{M}$$ | **0.01585361** | **0.000410153** | **0.015020079** | **0.016687142** |
| Logistic | 126.1920066\*\* | $$y\_{0}$$ | -4.82197507 | 0.279237005 | -5.38945294 | -4.254497201 |
| $$r\_{L}$$ | 0.147843497 | 0.013160922 | 0.121097286 | 0.174589708 |
| Gompertz | 436.1160895\*\* | $$y\_{0}$$ | -1.64537367 | 0.054676463 | -1.756489611 | -1.534257728 |
| $$r\_{G}$$ | 0.053816419 | 0.002576996 | 0.048579333 | 0.059053505 |
| 0.50 | Monomolecular | 1292.177217\*\* | $$y\_{0}$$ | **-0.095976325** | **0.011903294** | **-0.120166729** | **-0.071785921** |
| $$r\_{M}$$ | **0.020167011** | **0.000561023** | **0.019026876** | **0.021307147** |
| Logistic | 135.9508081\*\* | $$y\_{0}$$ | -4.66383287 | 0.276877341 | -5.226515326 | -4.101150414 |
| $$r\_{L}$$ | 0.152156898 | 0.013049707 | 0.125636703 | 0.178677092 |
| Gompertz | 532.6762176\*\* | $$y\_{0}$$ | -1.631945607 | 0.054686577 | -1.743082103 | -1.520809111 |
| $$r\_{G}$$ | 0.059487501 | 0.002577473 | 0.054249447 | 0.064725556 |
| 0.40 | Monomolecular | 990.5926353\*\* | $$y\_{0}$$ | **-0.143582563** | **0.018787409** | **-0.181763172** | **-0.105401954** |
| $$r\_{M}$$ | **0.02786941** | **0.000885483** | **0.026069892** | **0.029668928** |
| Logistic | 155.7683267\*\* | $$y\_{0}$$ | -4.488295557 | 0.271759658 | -5.040577629 | -3.936013484 |
| $$r\_{L}$$ | 0.159859297 | 0.012808501 | 0.13382929 | 0.185889303 |
| Gompertz | 758.7125737\*\* | $$y\_{0}$$ | -1.631689466 | 0.053084853 | -1.739570868 | -1.523808065 |
| $$r\_{G}$$ | 0.068916402 | 0.002501981 | 0.063831765 | 0.074001038 |
| **0.25** | Monomolecular | 171.1757723\*\* | $$y\_{0}$$ | -0.588192091 | 0.129213662 | -0.850785846 | -0.325598336 |
| $$r\_{M}$$ | 0.079678824 | 0.006090063 | 0.067302327 | 0.092055321 |
| Logistic | 385.4504086\*\* | $$y\_{0}$$ | -4.462901455 | 0.228748933 | -4.927775217 | -3.998027693 |
| $$r\_{L}$$ | 0.211668711 | 0.010781332 | 0.189758408 | 0.233579013 |
| Gompertz | 700.4618084\*\* | $$y\_{0}$$ | **-1.968300076** | **0.099877178** | **-2.171274923** | **-1.765325229** |
| $$r\_{G}$$ | **0.124586741** | **0.004707384** | **0.115020187** | **0.134153296** |

*Values in bold indicate coefficients with the highest contribution to the model fit according to the standard asymptotic error test.*

*\*\* Level of significance of 1%.*

*1y0 = disease in proportion in the first observation.*

*2r\* = disease growth rate of a specific model.*