APPENDIX

Table A1: Equations used in the materials and method section. Abbreviations are defined in the text

Equation	Description	No.
$R^2\ [0\text{-}1] = \frac{\sum_{i=1}^{n} (LA_{LiDAR} - \overline{LA_{lab}})^2}{\sum_{i=1}^{n} (LA_{lab} - \overline{LA_{lab}})^2}$	Coefficient of determination	(A1)
$RRMSE\ [\%] = \frac{\sqrt{\frac{1}{n} \times \sum_{i=1}^{n} (LA_{lab} - LA_{LiDAR})^2}}{\overline{LA_{lab}}} \times 100$	Relative root mean squared error	(A2)
$f(x) = a + \frac{b}{1 + e^{\frac{-(x-c)}{d}}}$	Sigmoid growth model	(A3)
$GDD_{TB} = 0.5 \times (T_{Max} + T_{Min}) - T_B;$ if $0.5 \times (T_{Max} + T_{Min}) - T_B > 0$	Growing degree days	(A4)

Table A2: Functions of fruit and leaf area development and LA_{LiDAR} fitted with standard regression methods. Abbreviations are defined in the text

Equations	R^2	Definition	No.
$FM(DAFB) = 185.493-(12077.2/((1.05883)^{DAFB}+64.6686))$	0.85	Development in FM of Pinova fruit	(A5.1)
$M(DAFB) = 183.972 - (5982.92/((1.04047)^{DAFB} + 30.9077))$	0.87	Development in FM of RoHo 3615 fruit	(A5.2)
$C(DAFB) = 15.599 - (1644.78 / ((1.06415)^{DAFB} + 105.827))$	0.85	Development in C content of Pinova fruit	(A6.1)
$C\ (DAFB) = 13.445 - (674.033 / ((1.04798)^{DAFB} + 49.0924))$	0.84	Development in C content of RoHo 3615 fruit	(A6.2)
$AGR_{FM}(DAFB) = (690.363 \times (1.05883)^{DAFB})/((1.05883)^{DAFB} + 64.6686)^2$	-	Daily growth rates in FM of Pinova fruit	(A7.1)
$AGR_{FM}(DAFB) = (237.377 \times (1.04047)^{DAFB}) / ((1.04047)^{DAFB} + 30.9077)^2$	-	Daily growth rates in FM of RoHo 3615 fruit	(A7.2)
$AGR_{C}(DAFB) = (102.262 \times (1.06415)^{DAFB}) / ((1.06415)^{DAFB} + 105.827)^2$	-	Daily growth rates in C of Pinova fruit	(A8.1)
$AGR_{C}(DAFB) = (31.5857 \times (1.04798)^{DAFB}) / ((1.04798)^{DAFB} + 49.0924)^2$	-	Daily growth rates in C of RoHo 3615 fruit	(A8.2)
$FM_{norm}(DAFB) = 1.01835-(66.3031/((1.05883)^{DAFB}+64.6686))$		Development in FM of Pinova fruit, normalized to FM at harvest	A9.1
$FM_{norm}(DAFB) = 1.1124-(36.176/((1.04047)^{DAFB}+ 30.9077))$		Development in FM of RoHo 3615 fruit, normalized to FM at harvest	A9.2
$C_{norm}(DAFB) = 1.01451 - (106.971 / ((1.06415)^{DAFB} + 105.827))$		Development in C of Pinova fruit normalized to C at harvest	A10.1
$C_{norm}\ (DAFB) = 1.06172 - (53.2266 / ((1.04798)^{DAFB} + 49.0924))$		Development in C of RoHo 3615 fruit normalized to C at harvest	A10.2
$C_{rel}(DAFB) = 0.5035 - 0.00023 \times DAFB$	0.94	Fraction of C on the DM of Pinova fruit	(A11.1)
$C_{rel}(DAFB) = 0.5124 - 0.00027 \times DAFB$	0.76	Fraction of C on the DM of RoHo 3615 fruit	(A11.2)
$LA_{LiDAR}(PPT) = 1.62 + (6.822 \times 10^{-5} \times PPT)$	-	Function to estimate LA_{LiDAR} from PPT of Pinova trees.	(A12.1)
$LA_{LiDAR}(PPT) = 1.491 + (6.987 \times 10^{-5} \times PPT)$	-	Function to estimate LA_{LiDAR} from PPT of RoHo 3615 trees.	(A12.2)
$LA_{tree}(DABB) = -0.024 + \frac{3.8301986}{1 + e^{\frac{-(DABB - 54.731847)}{10.847129}}}$	-	Development of the canopy leaf area of Pinova trees	(A13.1)
$LA_{tree}(DABB) = -0.067 + \frac{5.382473}{1 + e^{\frac{-(DABB - 54.766887)}{12.581858}}}$	-	Development of the total leaf area of RoHo 3615 trees	(A13.2)

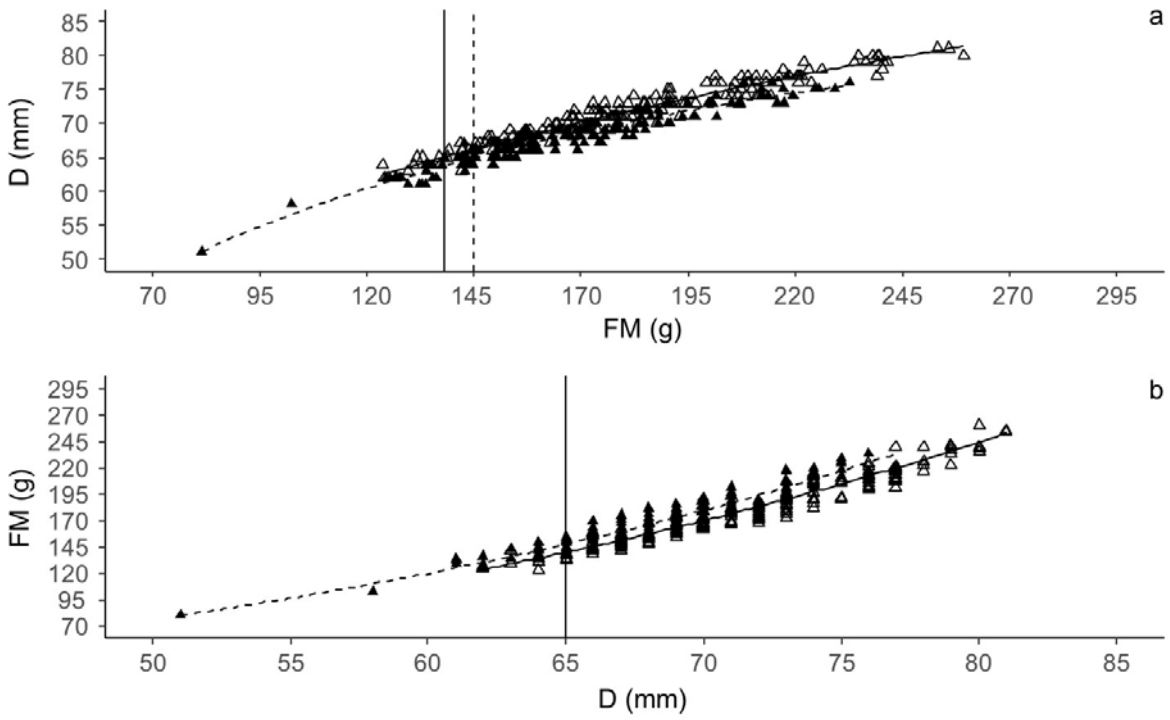

Fig. A1: Relationship between (a) fruit fresh mass (FM) (g) and diameter (D) (mm), (b) D and FM at the harvest time of Pinova/M.26 apple (n = 180; open symbol, solid line) and RoHo 3615/M.9 (n = 180; closed symbol, dashed line) in 2018. The vertical lines indicate the minimum fruit size for market entry of 65 mm. (Pinova: $D = 29.275 + 108.34959\ FM\ (280.67889 + FM)^{-1}$, $R^2 = 0.94$, $FM = 18.2 + 0.00044199462\ D^3$, $R^2 = 0.94$; RoHo 3615: $D = 10.66 + 96.547187\ FM\ (112.84451 + FM)^{-1}$, $R^2 = 0.93$, $FM = 17.966 + 0.00047130511\ D^3$, $R^2 = 0.93$).