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Article

Supplementary Materials: Using mutation breeding to improve the eating characteristics of the Fusarium wilt resistant banana variety, 'Goldfinger' (AAAB)

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Table S1. Definition of sensory attributes used to describe bananas in the Phase II taste-testing surveys.

Descriptors	Definition
Sweet	Sugary
Tart	A sour, slightly acidic taste
Firm	The force required to compress a sample between teeth
Creamy	Smooth, tender pulp that is of an even consistency and 'melts' as it is chewed. A soft texture but not mushy, slimy, sticky or mealy (gritty)
Mucilaginous	A sticky, slimy texture
Ripeness	The optimal taste and texture characteristics for eating
Flavour	Banana flavour and intensity
Aftertaste	The taste remaining in the mouth after swallowing

Table S2. The 26 sensory attributes developed and defined by the trained sensory panel of 11 assessors. The anchors were used to rate each sample on a 0–100 unstructured line scale.

	Descriptors	**Definition**	**Anchors**
Appearance	Uniformity of colour (cut side)	Even colour = high uniformity, Patchy colour = low uniformity	Low to high
	Shape (cut side)	Round to oval	Round to oval
	Moistness (cut side)	Matte appearance = dry Shiny/ glossy/ glittery appearance = moist	Low to high
Aroma	Overall aroma Intensity	Overall aroma intensity	Low to high
	Confectionery	Aroma of isoamyl acetate (pear drops)	None to high
	Tropical fruit	Aroma associated with tropical fruits (pineapple, mango)	None to high
	Citrus	Aroma of citrus fruit juice (lemon, lime)	None to high
	Sappy/ resin	Aroma of fresh cut grass	None to high
	Musty	Aroma of damp earth	None to high
	Perfumed	Aroma of floral perfume	None to high
	Chemical	Potent aroma of ethanol in cleaning chemicals	None to high
Texture	Firmness	Force required to compress a sample between front teeth	Low to high
	Lumpy	Consisting of lumpy pieces that do not break down/disintegrate during mastication	Low to high
	Chalky	Chalky mouthfeel	Low to high
	Gritty	Consisting of rough particles present in the mouth during mastication	Low to high
Flavour	Overall Flavour Intensity	Overall flavour intensity	Low to high
	Sweetness	Basic taste	None to high
	Confectionery	Aroma of isoamyl acetate (pear drops)	None to high
	Sour	Basic taste	None to high
	Bitter	Basic taste	None to high
	Fruity	Flavours of apple and green melon	None to high
	Sappy/ resin	Flavour of volatiles from fresh cut grass	None to high
	Chemical	Potent flavour of volatiles from ethanol in cleaning chemicals products, ether, soap	None to high
	Starchy	Flavour of potato and other potato-based starchy foods	None to high
Aftertaste/ Afterfeel	Astringency	Drying/puckering in the mouth	Low to high
	Mouth coating	The presence of creamy/oily residue after swallowing	Low to high

Table S3. The plant crop, first and second ratoon agronomic performance of the top 20 Goldfinger Mutant Selections (GMS). Significant differences to Goldfinger ($\alpha = 0.05$) are depicted by the symbol *. The first and second ratoon data was collected after the plant crop had been nurse-suckered.

Variant	Planting to harvest (months)	Bunch wt[1] (kg)	Bunch wt/12 months[2,3,4]	Pseudostem height (m)	Height: Circum. ratio	Fingers/ bunch	3rd hand finger length (cm)
Plant Crop							
Goldfinger	**12.2**	**27.3**	**27.0**	**3.1**	**4.2**	**129**	**24.0**
GMS 144	12.4	23.0	22.3*	2.8	4.4	132	20.8*
GMS 211	13.9*	21.8*	18.9*	3.2	4.3	125	18.7*
GMS 521	13.2*	28.2	25.7	2.9	4.2	138	20.8*
GMS 544	12.1	24.7	24.5	3.0	4.4	139	20.6*
GMS 903	12.1	27.5	27.3	2.9	4.0	153*	21.6*
GMS 119	12.4	22.4*	21.8*	2.7*	3.9*	149*	20.6*
GMS 126	12.3	28.4	27.7	3.2	4.2	145	24.0
GMS 145	13.0*	17.9*	16.6*	2.6*	4.4*	117	20.0*
GMS 255	13.0	16.8*	15.7*	3.5*	6.1*	92*	25.2
GMS 333	12.5	14.6*	14.0*	2.9	4.1	107*	17.2*
GMS 339	13.1*	22.1*	20.5*	3.1	4.2	112	21.3*
GMS 366	11.3*	33.4*	35.6*	3.0	3.9*	162*	23.5
GMS 417	12.2	30.2	30.0	3.0	4.1	149*	22.9
GMS 423	14.1*	20.8*	17.8*	3.0	4.5	138	17.6*
GMS 434	12.3	21.5*	21.0	2.5*	3.8*	135	20.7*
GMS 473	12.0	19.2*	19.2*	2.5*	4.7*	115	20.3*
GMS 602	12.0	19.9*	19.9*	3.1	4.2	140	19.1*
GMS 746	12.1	21.5*	21.3*	2.4*	4.0	136	21.3*
GMS 766	12.8	15.1*	14.1*	2.6*	3.8	106*	18.4*
GMS 843	11.3*	19.0*	20.0*	2.3*	4.1	129	20.0*
First Ratoon							
Goldfinger	**11.1**	**40.6**	**44.9**	**3.6**	**4.0**	**153**	**24.4**
GMS 144	10.5	30.4*	34.9*	3.3*	3.9	158	21.8*
GMS 211	13.0	28.9*	26.9*	3.6	4.1	150	19.8*
GMS 521	10.3	33.5*	39.2	3.5	3.8	158	22.3*
GMS 544	10.4	31.4*	36.6*	3.5	3.9	151	21.6*
GMS 903	10.2	42.2	49.8	3.3*	3.6*	182*	24.0
GMS 119	10.4	35.7	41.2	3.2*	3.4*	175	23.0*
GMS 126	10.8	47.2*	53.0*	3.9	3.8	180*	25.0
GMS 145	10.1	28.6*	34.1*	3.4*	4.4*	122*	22.6*
GMS 255	10.0	22.3*	26.9*	4.6*	5.8*	107*	27.3*
GMS 333	11.5	21.3*	22.4*	3.4*	3.9	136	18.0*
GMS 339	10.8	37.9	42.1	3.7	3.8	158	21.7*
GMS 366	9.8	38.4	47.0	3.5	3.8	154	25.5
GMS 417	9.9	43.5	52.8*	3.6	3.7*	170	25.6
GMS 423	11.8	24.5*	25.1*	3.7	4.1	140	18.5*
GMS 434	9.6	34.3*	42.8	3.1*	3.5*	173	23.5
GMS 473	9.6	28.5*	35.6	3.4	4.7*	149	22.0*
GMS 602	11.4	33.2*	35.3	3.6	3.8	157	21.5*
GMS 746	10.6	31.9*	36.2*	3.0*	3.7*	165	22.6*
GMS 766	11.4	23.1*	24.7*	3.5	3.7*	146	19.0*
GMS 843	9.3	24.6*	31.6*	2.8*	3.9	140	22.6*
Second Ratoon							
Goldfinger	**21.2**	**39.5**	**46.6**	**4.2**	**4.1**	**180**	**24.3**
GMS 144	20.4	34.9	38.6*	4.0	4.2	208	21.6*
GMS 211	24.1*	21.8*	26.2*	4.1	4.4*	157	17.0*
GMS 521	19.9	33.7*	40.9	4.0	4.1	196	20.3*

GMS 544	20.4	34.4	39.2*	4.0	4.3	186	21.5*
GMS 903	20.2	38.6	48.5	3.8*	3.9	222*	22.1*
GMS 119	20.5	32.9*	40.1	3.6*	3.9*	188	21.5*
GMS 126	21.2	39.6	49.0	4.2	4.1	184	24.1
GMS 145	19.7*	25.7*	33.0*	3.6*	4.3	138*	22.0*
GMS 255	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
GMS 333	22.9*	18.4*	22.3*	3.6*	3.9	135*	17.7*
GMS 339	20.8	33.7*	42.1	4.2	3.9	170	21.8*
GMS 366	19.6*	37.6	48.5	4.0	4.1	186	24.2
GMS 417	19.9	42.8	52.4	4.1	4.0	196	24.0
GMS 423	22.9*	22.7*	25.2*	4.1	4.1	150	18.1*
GMS 434	20.0	30.9*	38.8*	3.5*	4.0	197	20.3*
GMS 473	19.2*	26.7*	34.8*	4.1	5.3*	180	21.3*
GMS 602	21.6	26.9*	33.0*	3.9	3.9	158	19.4*
GMS 746	21.7	29.8*	36.3*	3.4*	4.0	214	21.4*
GMS 766	22.4	23.7*	26.8*	3.9	4.0	136*	19.6*
GMS 843	19.4*	24.6*	31.0*	3.0*	4.3	150	22.1*

[1] For the first and second ratoon this is calculated from the date of nurse suckering. [2] Excludes stalk weight. [3] Bunch wt/12 months for Plant Crop = (bunch weight [kg]/time from planting to harvest [days]) x 365. [4] Bunch wt/12 months for First Ratoon = (bunch weight [kg]/time from nurse suckering to harvest [days]) x 365. [5] Bunch wt/12 months for Second Ratoon = ((first ratoon bunch weight [kg] + second ratoon bunch weight [kg])/ time from nurse suckering to second ratoon harvest [days]) × 365. * Significantly different to Goldfinger ($\alpha = 0.05$).

Table S4. The 5-point Just About Right (JAR) responses from consumers across the two evaluations dates, December 2021 and April 2022, expressed as a percentage of respondents (%).

	GMS 144	GMS 211	GMS 521	GMS 544	GMS 903	Goldfinger	Lady Finger	Cavendish
External Colour (%)								
Much too brown	2	4	0	1	5	1	4	1
Somewhat too brown	19	32	24	12	23	15	32	1
Just Right (yellow)	55	49	63	71	54	64	55	79
Somewhat too pale yellow	23	13	12	16	16	21	9	18
Much too pale yellow	2	1	1	0	2	0	0	1
Ripeness (%)								
Very overripe	2	3	0	0	3	1	3	0
Somewhat overripe	37	38	26	18	26	22	33	6
Just Right	52	56	65	72	63	71	56	79
Somewhat underripe	10	3	9	10	7	6	6	14
Very underripe	0	1	0	0	0	0	1	0
Fruit length (%)								
Much too big	2	0	2	3	3	13	0	1
Somewhat too big	20	3	8	17	13	33	1	14
Just Right	66	55	72	67	76	52	45	65
Somewhat too small	12	36	17	11	7	2	45	19
Much too small	0	6	1	2	0	0	9	1
Fruit outer width (%)								
Much too thick	3	7	5	13	2	9	1	0
Somewhat too thick	41	46	48	48	28	38	28	2
Just Right	53	45	44	39	63	52	66	83
Somewhat too thin	2	2	2	1	7	1	5	15
Much too thin	0	1	0	0	0	0	0	0
Fruit shape (%)								
Much too curved	0	0	1	0	0	1	0	2
Somewhat too curved	9	6	5	12	5	5	4	10
Just Right	65	52	53	54	68	65	59	88
Somewhat too straight	20	34	34	26	23	21	32	1
Much too straight	6	8	7	7	4	7	5	0
Peelability (%)								
Very Easy	33	37	27	19	33	36	46	34
Easy	45	47	35	30	36	46	43	33
Moderate	19	12	27	30	21	15	9	25
Difficult	3	4	8	19	9	3	2	6
Very difficult	0	0	2	3	1	0	1	2
Peel thickness (%)								
Much too thick	0	1	2	5	1	4	0	0
Somewhat too thick	17	14	30	37	18	29	8	10
Just Right	75	71	68	56	74	65	70	83

Somewhat too thin	7	13	1	2	7	1	19	7
Much too thin	0	0	0	0	1	0	3	0
Internal colour (%)								
Much too dark	1	2	0	1	2	0	1	1
Somewhat too dark	5	8	2	4	2	4	6	0
Just Right	80	72	84	84	85	78	80	90
Somewhat too pale	14	18	13	11	9	18	13	9
Much too pale	0	0	1	1	2	0	0	0
Fruit inner width (%)								
Much too thick	1	5	5	11	2	6	0	0
Somewhat too thick	30	48	32	43	22	33	24	2
Just Right	64	43	61	44	61	60	71	86
Somewhat too thin	5	4	2	2	14	1	5	13
Much too thin	0	0	0	0	2	0	0	0
Aroma (%)								
Overripe banana	5	6	1	3	3	1	4	2
Sweet, characteristic ripe banana	35	31	48	38	34	31	27	51
Sweet with a hint of green banana	41	33	37	40	46	45	38	30
Green banana	16	27	13	16	16	21	28	14
Intense green banana	2	3	2	2	1	1	2	3
Firmness (%)								
Much too firm	0	0	0	1	2	0	0	1
Somewhat too firm	3	8	16	13	10	4	15	13
Just Right	63	54	72	71	70	63	78	80
Somewhat too soft	30	31	10	13	17	30	6	6
Much too soft	4	6	2	2	1	2	1	0
Moistness (%)								
Much too moist	0	3	0	0	0	1	0	1
Somewhat too moist	12	27	7	7	5	13	5	4
Just Right	78	68	83	82	84	62	82	69
Somewhat too dry	10	2	11	11	8	22	13	26
Much too dry	0	1	0	0	2	1	0	0
Sweetness (%)								
Much too strong	1	1	0	0	1	1	0	0
Somewhat too strong	7	16	20	15	7	6	10	3
Just Right	63	48	57	65	66	42	67	62
Somewhat too weak	26	28	21	16	24	44	22	31
Much too weak	3	7	2	4	2	7	1	4