ПРИЛОЖЕНИЕ
к статье Е.В. Чумановой, Т.Т. Ефремовой, К.В. Соболева, Е.А. Косяевой
«Антоцианы и фенольные соединения в окрашенном зерне пшеницы»

Таблица S1. Содержание антоцианов в зерне пшеницы с различной окраской

Grain color	Part of grain	TAC (μg C3G/g)	Reference
White	Whole meal	7.7	Liu et al., 2010
		2.2	Garg et al., 2016
		13.0	Sharma S. et al., 2018
Red	Whole meal	5.1	Abdel-Aal, Hucl, 2003
		9.6	Liu et al., 2010
		1.2–24.6 (*T. durum*)	Ficco et al., 2014
		72.4	Wang et al., 2020
	Flour	1.6	Abdel-Aal, Hucl, 2003
	Bran	10.1	Abdel-Aal, Hucl, 2003
Yellow	Whole meal	9.5	Liu et al., 2010
		11.2	Wang et al., 2020
	Flour	10.89	Saini et al., 2023
	Bran	23.47	
Blue	Whole meal	152.2	Abdel-Aal, Hucl, 2003
		153.1	Abdel-Aal et al., 2006
		82.7–174.3	Ficco et al., 2014
		68.2–137.2	Garg et al., 2016
		96.4–120.6	Sharma S. et al., 2018
		95.2	Wang et al., 2020
		87.6–96.4	Gordeeva et al., 2022
		102.96	Iannucci et al., 2022
		18.8–21.9	Sardella et al., 2023
	Flour	21.1	Abdel-Aal, Hucl, 2003
		17.0	Siebenhandl et al., 2007
		103.0	Iannucci et al., 2022
	Bran	452.9	Abdel-Aal, Hucl, 2003
		225.8	Siebenhandl et al., 2007
		181.6	Iannucci et al., 2022
	Shorts	245.5	Siebenhandl et al., 2007
Purple	Whole meal	93.1	Abdel-Aal, Hucl, 2003
		12.8	Abdel-Aal et al., 2006
		34.0	Siebenhandl et al., 2007
		491.1	Hosseinian et al., 2008
		25.4–234.5	Liu et al., 2010
		8.1–50.2 (*T. durum*)	Ficco et al., 2014
		16.0–86.1	Garg et al., 2016
		213	Abdel-Aal et al., 2018
		43.9–122.5	Sharma S. et al., 2018
		143.6	Wang et al., 2020
		58.9	Gordeeva et al., 2022
		36.3–72.9	Iannucci et al., 2022
		1.2–14.9	Sardella et al., 2023
	Flour	6.9	Abdel-Aal, Hucl, 2003
		8.2	Siebenhandl et al., 2007
		36.3–72.9	Iannucci et al., 2022
		68.0–206.2	Saini et al., 2023

Окончание табл. S1

Grain color	Part of grain	TAC (μg C3G/g)	Reference
Purple	Coarse whole-wheat flour	38.4	Jiang et al., 2024
	Fine whole-wheat flour	45.1	
	Superfine whole-wheat flour	56.3	
	Bran	235.9	Abdel-Aal, Hucl, 2003
		423	Abdel-Aal et al., 2018
		39.2–116.6	Iannucci et al., 2022
		117.9–449.2	Saini et al., 2023
	Bran + shorts	168.6	Siebenhandl et al., 2007
Black	Whole meal	128.5–198.0	Garg et al., 2016
		134.0–135.8	Sharma S. et al., 2018
		277.6	Wang et al., 2020
		236.7–269.3	Gordeeva et al., 2022
		25.9–42.9	Sardella et al., 2023

TAC – total anthocyanin content, C3G – cyanidin-3-glucoside.

Таблица S2. Состав антоцианов в зерне пшеницы с различной окраской

Grain color	Type of anthocyanin	Amount μg C3G/g	Detection method	References
White	Cyanidin-3-glucoside	n/a	UPLC/MS	Garg et al., 2016
	Cyanidin-3-rutinoside	n/a	UPLC/MS	Garg et al., 2016
	Delphinidin-3-galactoside	0.03	UPLC	Sharma N. et al., 2018
	Malvidin-3-rutinoside	n/a	UPLC/MS	Garg et al., 2016
Red	Cyanidin-3-glucoside	0.59–10.23	HPLC	Ficco et al., 2014
		5.60	HPLC	Shamanin et al., 2024
	Malvidin-3-glucoside	0.06–0.43	HPLC	Ficco et al., 2014
	Peonidin-3-galactoside	0.06–3.87	HPLC	Ficco et al., 2014
Blue	Cyanidin-3-glucoside	20.3	LC-MS	Abdel-Aal et al., 2006
		1.17–5.57	HPLC	Ficco et al., 2014
		n/a	HPLC/MS	Bartl et al., 2015
		n/a	UPLC/MS	Garg et al., 2016
		4.50	UPLC	Sharma N. et al., 2018
		6.10–11.56	HPLC	Iannucci et al., 2022
	Cyanidin-3-rutinoside	16.8	LC-MS	Abdel-Aal et al., 2006
		7.12–10.97	HPLC	Ficco et al., 2014
		n/a	UPLC/MS	Garg et al., 2016
		0.60	UPLC	Sharma N. et al., 2018
	Cyanidin-3-rutinoside-3′-glucoside	n/a	UPLC/MS	Garg et al., 2016
	Cyanidin-3-(2G-xylosylrutinoside)	n/a	UPLC/MS	Garg et al., 2016
	Cyanidin-3-(3″,6″-dimalonylglucoside)	n/a	HPLC/MS	Razgonova et al., 2021
	Cyanidin-3-(6″-succinylglucoside)	n/a	UPLC/MS	Garg et al., 2016
	Cyanidin-3-(6″-feruloylglucoside)-5-glucoside	n/a	UPLC/MS	Garg et al., 2016
	Cyanidin with 2 hexose/rhamnose/coumaric acid	n/a	HPLC/MS	Bartl et al., 2015
	Delphinidin-3-galactoside	4.95	UPLC	Sharma N. et al., 2018
	Delphinidin-3-glucoside	56.5	LC-MS	Abdel-Aal et al., 2006
		9.88–18.81	HPLC	Ficco et al., 2014
		n/a	HPLC/MS	Bartl et al., 2015
		n/a	UPLC/MS	Garg et al., 2016
		0.40	UPLC	Sharma N. et al., 2018
		15.50–30.30	HPLC	Iannucci et al., 2022
	Delphinidin-3-rutinoside	49.6	LC-MS	Abdel-Aal et al., 2006
		31.77–35.86	HPLC	Ficco et al., 2014
		n/a	HPLC/MS	Bartl et al., 2015
		n/a	UPLC/MS	Garg et al., 2016
		2.08	UPLC	Sharma N. et al., 2018
		36.50–72.51	HPLC	Iannucci et al., 2022
	Delphinidin-3-sambubioside	n/a	UPLC/MS	Garg et al., 2016
	Delphinidin-3-caffeoylglucoside	n/a	UPLC/MS	Garg et al., 2016
	Delphinidin with hexose and rhamnose	n/a	HPLC/MS	Bartl et al., 2015
	Delphinidin with hexose/3 hexose and rhamnose/coumaric acid	n/a	HPLC/MS	Bartl et al., 2015
	Malvidin-3-glucoside	10.26–13.81	HPLC	Ficco et al., 2014
		n/a	UPLC/MS	Garg et al., 2016
		5.50	UPLC	Sharma N. et al., 2018
		2.10–7.29	HPLC	Iannucci et al., 2022
	Malvidin-3-rutinoside	2.0	LC-MS	Abdel-Aal et al., 2006
		n/a	HPLC/MS	Bartl et al., 2015
		n/a	UPLC/MS	Garg et al., 2016
	Malvidin-3-(6″-p-caffeoylglucoside)	n/a	UPLC/MS	Garg et al., 2016

Продолжение табл. S2

Grain color	Type of anthocyanin	Amount μg C3G/g	Detection method	References
Blue	Delphinidin-3-rutinoside	49.6	LC-MS	Abdel-Aal et al., 2006
		31.77–35.86	HPLC	Ficco et al., 2014
		n/a	HPLC/MS	Bartl et al., 2015
		n/a	UPLC/MS	Garg et al., 2016
		2.08	UPLC	Sharma N. et al., 2018
		36.50–72.51	HPLC	Iannucci et al., 2022
	Delphinidin-3-sambubioside	n/a	UPLC/MS	Garg et al., 2016
	Delphinidin-3-caffeoylglucoside	n/a	UPLC/MS	Garg et al., 2016
	Delphinidin with hexose and rhamnose	n/a	HPLC/MS	Bartl et al., 2015
	Delphinidin with hexose/3 hexose and rhamnose/ coumaric acid	n/a	HPLC/MS	Bartl et al., 2015
	Malvidin-3-glucoside	10.26–13.81	HPLC	Ficco et al., 2014
		n/a	UPLC/MS	Garg et al., 2016
		5.50	UPLC	Sharma N. et al., 2018
		2.10–7.29	HPLC	Iannucci et al., 2022
	Malvidin-3-rutinoside	2.0	LC-MS	Abdel-Aal et al., 2006
		n/a	HPLC/MS	Bartl et al., 2015
		n/a	UPLC/MS	Garg et al., 2016
	Malvidin-3-(6″-p-caffeoylglucoside)	n/a	UPLC/MS	Garg et al., 2016
	Malvidin-3-rutinoside-5-glucoside	n/a	UPLC/MS	Garg et al., 2016
		n/a	HPLC/MS	Razgonova et al., 2021
	Malvidin with 2 hexose and rhamnose	n/a	HPLC/MS	Bartl et al., 2015
	Pelargonidin-3-glucoside	0.39	UPLC	Sharma N. et al., 2018
	Pelargonidin-3-rutinoside	n/a	UPLC/MS	Garg et al., 2016
	Pelargonidin-3-(6″-malonylglucoside)	n/a	UPLC/MS	Garg et al., 2016
	Peonidin-3-arabinoside	n/a	UPLC/MS	Garg et al., 2016
		n/a	HPLC/MS	Razgonova et al., 2021
		0.95–3.49	HPLC	Ficco et al., 2014
	Peonidin-3-galactoside	1.9	HPLC	Ficco et al., 2014
	Peonidin-3-glucoside	0.76–0.99	HPLC	Ficco et al., 2014
		n/a	UPLC/MS	Garg et al., 2016
		n/a	HPLC/MS	Razgonova et al., 2021
		8.45–12.30	HPLC	Iannucci et al., 2022
	Peonidin-3-rutinoside	1.2	LC-MS	Abdel-Aal et al., 2006
		n/a	HPLC/MS	Bartl et al., 2015
		n/a	UPLC/MS	Garg et al., 2016
		0.76	UPLC	Sharma N. et al., 2018
		n/a	HPLC/MS	Razgonova et al., 2021
	Peonidin-3,5-diglucoside	n/a	UPLC/MS	Garg et al., 2016
		0.31	UPLC	Sharma N. et al., 2018
	Peonidin-3-rutinoside-5-glucoside	n/a	UPLC/MS	Garg et al., 2016
	Peonidin with 2 hexose and rhamnose/coumaric acid	n/a	HPLC/MS	Bartl et al., 2015
	Petunidin-3-glucoside	2.2	LC-MS	Abdel-Aal et al., 2006
		n/a	UPLC/MS	Garg et al., 2016
		3.18	UPLC	Sharma N. et al., 2018
		13.75–25.19	HPLC	Iannucci et al., 2022
	Petunidin-3-rutinoside	4.5	LC-MS	Abdel-Aal et al., 2006
	Petunidin-3-rutinoside-5-glucoside	n/a	UPLC/MS	Garg et al., 2016
		n/a	HPLC/MS	Razgonova et al., 2021
	Petunidin with hexose and rhamnose	n/a	HPLC/MS	Bartl et al., 2015

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Grain color	Type of anthocyanin	Amount μg C3G/g	Detection method	References
Purple	Cyanidin-3-arabinoside	25.1	HPLC UPLC/MS/MS	Hosseinian et al., 2008
	Cyanidin-3-galactoside	72.0	HPLC UPLC/MS/MS	Hosseinian et al., 2008
	Cyanidin-3-glucoside	4.0	LC-MS	Abdel-Aal et al., 2006
		103.0	HPLC UPLC/MS/MS	Hosseinian et al., 2008
		0.63–29.00	HPLC	Ficco et al., 2014
		n/a	HPLC/MS	Bartl et al., 2015
		n/a	UPLC/MS	Garg et al., 2016
		116.7	LC-MS	Abdel-Aal et al., 2018
		2.64	UPLC	Sharma N. et al., 2018
		3.12–4.86	HPLC	Iannucci et al., 2022
		65.51–161.15	UHPLC-QQQ-MS/MS	Jiang et al., 2024
		4.48–254.2	HPLC	Shamanin et al., 2024
	Cyanidin-3-rutinoside	n/a	UPLC/MS	Garg et al., 2016
		85.1	LC-MS	Abdel-Aal et al., 2018
		0.20	UPLC	Sharma N. et al., 2018
		3.01–13.79	UHPLC-QQQ-MS/MS	Jiang et al., 2024
		6.13–161.2	HPLC	Shamanin et al., 2024
	Cyanidin-3-rutinoside-3'-glucoside	n/a	UPLC/MS	Garg et al., 2016
	Cyanidin-3-(6″-malonylglucoside)	1.2	LC-MS	Abdel-Aal et al., 2006
		n/a	UPLC/MS	Garg et al., 2016
		150.3	LC-MS	Abdel-Aal et al., 2018
		1.94–7.38	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Cyanidin-3-(3″,6″-dimalonylglucoside)	n/a	UPLC/MS	Garg et al., 2016
	Cyanidin-3-(6″-feruloylglucoside)-5-glucoside	n/a	UPLC/MS	Garg et al., 2016
	Cyanidin-3-(6″-succinylglucoside)	2.9	LC-MS	Abdel-Aal et al., 2006
		n/a	UPLC/MS	Garg et al., 2016
		7.1–14.4	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Cyanidin-3,5-diglucoside	1.7	LC-MS	Abdel-Aal et al., 2006
		1.45–2.87	UHPLC-QQQ-MS/MS	Jiang et al., 2024
		162.2	HPLC	Shamanin et al., 2024
	Cyanidin-3-(6″-acetylglucoside)	1.22–3.63	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Cyanidin-malonyl-acetyl-glucoside	0.75–0.78	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Cyanidin with hexose and malonic/acetic acid	n/a	HPLC/MS	Bartl et al., 2015
	Cyanidin chloride	5.2	HPLC UPLC/MS/MS	Hosseinian et al., 2008
		0.53–1.42	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Delphinidin-3-arabinoside	16.7	HPLC UPLC/MS/MS	Hosseinian et al., 2008
	Delphinidin-3-galactoside	38.3	HPLC UPLC/MS/MS	Hosseinian et al., 2008
		0.40	UPLC	Sharma N. et al., 2018
	Delphinidin-3-glucoside	n/a	UPLC/MS	Garg et al., 2016
		0.08	UPLC	Sharma N. et al., 2018
		1.20	HPLC	Iannucci et al., 2022
		24.46–45.13	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Delphinidin-3-rutinoside	n/a	HPLC/MS	Bartl et al., 2015
		n/a	UPLC/MS	Garg et al., 2016
		3.7	LC-MS	Abdel-Aal et al., 2018
		1.64–2.40	UHPLC-QQQ-MS/MS	Jiang et al., 2024
		2.66	HPLC	Iannucci et al., 2022

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Grain color	Type of anthocyanin	Amount μg C3G/g	Detection method	References
Purple	Delphinidin-3-(6″-malonylglucoside)	3.5	LC-MS	Abdel-Aal et al., 2018
		0.67–1.83	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Delphinidin-3-(6″-caffeoylglucoside)	n/a	UPLC/MS	Garg et al., 2016
	Delphinidin with hexose and coumaric acid	n/a	HPLC/MS	Bartl et al., 2015
	Malvidin-3-glucoside	51.6	HPLC UPLC/MS/MS	Hosseinian et al., 2008
		0.17–2.35	HPLC	Ficco et al., 2014
		n/a	UPLC/MS	Garg et al., 2016
		1.32	UPLC	Sharma N. et al., 2018
		33.30–76.82	UHPLC-QQQ-MS/MS	Jiang et al., 2024
		6.68–31.88	HPLC	Shamanin et al., 2024
	Malvidin-3-rutinoside	n/a	HPLC/MS	Bartl et al., 2015
		n/a	UPLC/MS	Garg et al., 2016
		2.6	LC-MS	Abdel-Aal et al., 2018
		14.74–20.79	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Malvidin-3-(6″-p-caffeoylglucoside)	n/a	UPLC/MS	Garg et al., 2016
	Malvidin-3-rutinoside-5-glucoside	n/a	UPLC/MS	Garg et al., 2016
	Malvidin-(6″-succinylglucoside)	1.3	LC-MS	Abdel-Aal et al., 2018
		1.54–2.66	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Pelargonidin-3-arabinoside	9.3	HPLC UPLC/MS/MS	Hosseinian et al., 2008
	Pelargonidin-3-galactoside	26.1	HPLC UPLC/MS/MS	Hosseinian et al., 2008
	Pelargonidin-3-glucoside	28.8	HPLC UPLC/MS/MS	Hosseinian et al., 2008
		n/a	HPLC/MS	Bartl et al., 2015
		n/a	UPLC/MS	Garg et al., 2016
		1.88	UPLC	Sharma N. et al., 2018
		1.31–2.60	UHPLC-QQQ-MS/MS	Jiang et al., 2024
		2.84–111.8	HPLC	Shamanin et al., 2024
	Pelargonidin-3-rutinoside	n/a	UPLC/MS	Garg et al., 2016
		0.14–0.23	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Pelargonidin-3-(6″-malonylglucoside)	n/a	UPLC/MS	Garg et al., 2016
		1.2	LC-MS	Abdel-Aal et al., 2018
	Pelargonidin 3-(6-malonyl acetyl glucoside)	0.22–0.40	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Pelargonidin with hexose and acetic/malonic acid	n/a	HPLC/MS	Bartl et al., 2015
	Peonidin-3-arabinoside	28.4	HPLC UPLC/MS/MS	Hosseinian et al., 2008
	Peonidin-3-galactoside	0.06–3.11	HPLC	Ficco et al., 2014
	Peonidin-3-glucoside	2.1	LC-MS	Abdel-Aal et al., 2006
		2.7	HPLC UPLC/MS/MS	Hosseinian et al., 2008
		n/a	HPLC/MS	Bartl et al., 2015
		n/a	UPLC/MS	Garg et al., 2016
		27.4	LC-MS	Abdel-Aal et al., 2018
		1.27–2.80	HPLC	Iannucci et al., 2022
		55.94–90.79	UHPLC-QQQ-MS/MS	Jiang et al., 2024
		4.42–132.4	HPLC	Shamanin et al., 2024
	Peonidin-3-rutinoside	7.4	LC-MS	Abdel-Aal et al., 2018
		3.86–5.74	UHPLC-QQQ-MS/MS	Jiang et al., 2024

Продолжение табл. S2

Grain color	Type of anthocyanin	Amount μg C3G/g	Detection method	References
Purple	Peonidin-3,5-diglucoside	n/a	UPLC/MS	Garg et al., 2016
	Peonidin-3-(6″-malonylglucoside)	0.6	LC-MS	Abdel-Aal et al., 2006
		18.4	LC-MS	Abdel-Aal et al., 2018
		1.60–5.14	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Peonidin-3-rutinoside-5-glucoside	n/a	UPLC/MS	Garg et al., 2016
	Peonidin-3-(6″-succinyl glucoside	0.6	LC-MS	Abdel-Aal et al., 2006
		4.29–7.82	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Peonidin-malonyl-succinyl-glucoside	0.5	LC-MS	Abdel-Aal et al., 2006
	Peonidin malonyl acetyl glucoside	2.26–3.87	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Peonidin-3-(6″-acetylglucoside)	0.65–1.82	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Peonidin with hexose/rhamnose and malonic/acetic acid	n/a	HPLC/MS	Bartl et al., 2015
	Petunidin-3-glucoside	40.4	HPLC UPLC/MS/MS	Hosseinian et al., 2008
		n/a	UPLC/MS	Garg et al., 2016
		0.93–1.01	HPLC	Iannucci et al., 2022
		6.51–13.82	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Petunidin-3-rutinoside	1.54–1.97	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Petunidin-3-rutinoside-5-glucoside	n/a	UPLC/MS	Garg et al., 2016
	Petunidin 3-(6″-malonylglucoside)	3.2	LC-MS	Abdel-Aal et al., 2018
		0.39–0.66	UHPLC-QQQ-MS/MS	Jiang et al., 2024
	Petunidin with 2 hexose/3 hexose/ rhamnose and caffeic/coumaric acid	n/a	HPLC/MS	Bartl et al., 2015
Black	Cyanidin-3-glucoside	n/a	UPLC/MS	Garg et al., 2016
		20.50	UPLC	Sharma N. et al., 2018
		14.37–326.2	HPLC	Shamanin et al., 2024
	Cyanidin 3-(2″-galloylglucoside)	n/a	HPLC/MS	Razgonova et al., 2021
	Cyanidin-3-rutinoside	7.27–90.91	HPLC	Shamanin et al., 2024
	Cyanidin-3-rutinoside-3′-glucoside	n/a	UPLC/MS	Garg et al., 2016
		11.14	UPLC	Sharma N. et al., 2018
	Cyanidin-3,5-diglucoside	251.1	HPLC	Shamanin et al., 2024
	Cyanidin-3-(6″-malonylglucoside)	n/a	UPLC/MS	Garg et al., 2016
	Cyanidin-3-(3″,6″-dimalonylglucoside)	n/a	UPLC/MS	Garg et al., 2016
		n/a	HPLC/MS	Razgonova et al., 2021
	Cyanidin-3-(6″-succinylglucoside)	n/a	UPLC/MS	Garg et al., 2016
	Cyanidin-3-(2G-xylosylrutinoside)	n/a	UPLC/MS	Garg et al., 2016
	Cyanidin-3-(6″-feruloylglucoside)-5-glucoside	n/a	UPLC/MS	Garg et al., 2016
	Delphinidin-3-galactoside	29.14	UPLC	Sharma N. et al., 2018
	Delphinidin-3-glucoside	n/a	UPLC/MS	Garg et al., 2016
		25.64	UPLC	Sharma N. et al., 2018
		45.25–132.4	HPLC	Shamanin et al., 2024
	Delphinidin-3-rutinoside	n/a	UPLC/MS	Garg et al., 2016
		0.66	UPLC	Sharma N. et al., 2018
	Delphinidin-3-(6″-malonylglucoside)	n/a	UPLC/MS	Garg et al., 2016
	Delphinidin-3-caffeoylglucoside	n/a	UPLC/MS	Garg et al., 2016
	Malvidin-3-glucoside	n/a	UPLC/MS	Garg et al., 2016
		2.18	UPLC	Sharma N. et al., 2018
		79.66–236.0	HPLC	Shamanin et al., 2024
	Malvidin-3-rutinoside	n/a	UPLC/MS	Garg et al., 2016
		n/a	HPLC/MS	Razgonova et al., 2021

Окончание табл. S2

Grain color	Type of anthocyanin	Amount μg C3G/g	Detection method	References
Black	Malvidin-3-rutinoside-5-glucoside	n/a	UPLC/MS	Garg et al., 2016
	Malvidin-3-(6″-p-caffeoylglucoside)	n/a	UPLC/MS	Garg et al., 2016
	Pelargonidin-3-glucoside	n/a	UPLC/MS	Garg et al., 2016
		2.13	UPLC	Sharma N. et al., 2018
		1.11–58.61	HPLC	Shamanin et al., 2024
	Pelargonidin-3-rutinoside	n/a	UPLC/MS	Garg et al., 2016
	Pelargonidin-3-(6″-malonylglucoside)	n/a	UPLC/MS	Garg et al., 2016
	Peonidin-3-glucoside	n/a	UPLC/MS	Garg et al., 2016
		1.40	UPLC	Sharma N. et al., 2018
		n/a	HPLC/MS	Razgonova et al., 2021
		29.89–57.61	HPLC	Shamanin et al., 2024
	Peonidin-3-rutinoside	n/a	UPLC/MS	Garg et al., 2016
		0.97	UPLC	Sharma N. et al., 2018
		n/a	HPLC/MS	Razgonova et al., 2021
	Peonidin-3,5-diglucoside	n/a	UPLC/MS	Garg et al., 2016
		0.23	UPLC	Sharma N. et al., 2018
	Peonidin-3-rutinoside-5-glucoside	n/a	UPLC/MS	Garg et al., 2016
		n/a	HPLC/MS	Razgonova et al., 2021
	Petunidin-3-glucoside	n/a	UPLC/MS	Garg et al., 2016
		2.29	UPLC	Sharma N. et al., 2018
	Petunidin-3-rutinoside-5-glucoside	n/a	UPLC/MS	Garg et al., 2016

LC – liquid chromatography, HPLC – high-performance liquid chromatography, UPLC – ultra-performance liquid chromatography, UHPLC – ultra high performance liquid chromatography, MS – mass spectrometry, QQQ-MS/MS – triple quadrupole tandem mass spectrometry.

Таблица S3. Фенольные кислоты, присутствующие в зерне пшеницы

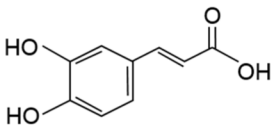
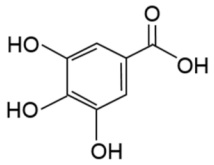
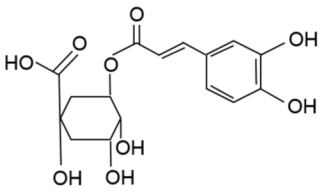
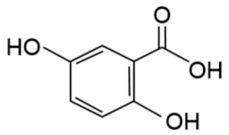
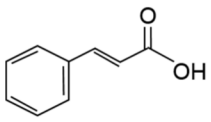
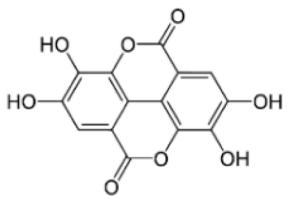
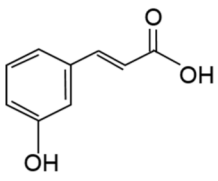
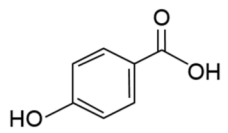
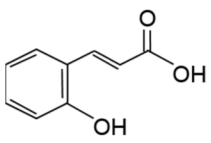
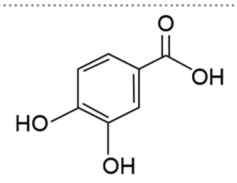
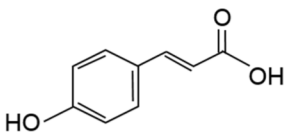
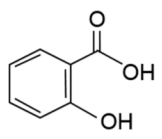
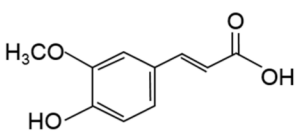
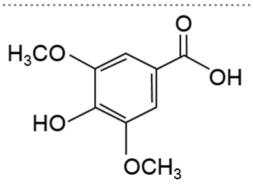
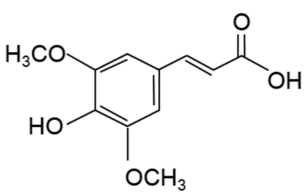
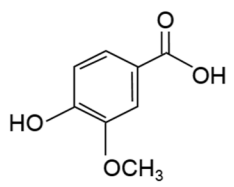
Hydroxycinnamic acids (C6-C3)	Chemical structure	Hydroxybenzoic acids (C6-C1)	Chemical structure
Caffeic acid		Gallic acid	
Chlorogenic acid		Gentisic acid	
Cinnamic acid		Ellagic acid	
m-Coumaric acid (3-Hydroxycinnamic)		p-Hydroxybenzoic acid (4-Hydroxybenzoic)	
o-Coumaric acid (2-Hydroxycinnamic)		Protocatechuic acid	
p-Coumaric acid (4-Hydroxycinnamic)		Salicylic acid	
Ferulic acid		Syringic acid	
Sinapic acid		Vanillic acid	

Таблица S4. Содержание свободных и связанных фенольных кислот в зерне пшеницы с различной окраской

Grain color	Part of grain	Free	Bound	TPC	Reference
Blue	Bran	n/a	n/a	761.64 mg FAE/100 g	Siebenhandl et al., 2007
Purple	Bran + shorts	n/a	n/a	822.23	
Blue	Shorts	n/a	n/a	619.98	
Purple	Whole meal	n/a	n/a	197.35	
Blue	Flour	n/a	n/a	64.65	
Purple		n/a	n/a	81.16	
Red	Whole meal	n/a	n/a	323–334 mg CE/100 g (*T. durum*)	Ficco et al., 2014
Blue		n/a	n/a	682	
Purple		n/a	n/a	316–626 (*T. durum*)	
White	Whole meal	506.5 μg GAE/g	n/a	n/a	Li et al., 2015
Purple		525.9–544.1	n/a	n/a	
Black		659.8	n/a	n/a	
White	Whole meal	67.94–75.36 μg/g	603.1–616.1 μg/g	1147.0–1208.7 μg FAE/g	Ma et al., 2016
Red		101.67–113.66	702.5–767.1	1256.9–1347.6	
Purple		98.19–95.71	903.9–917.2	1489.8–1525.1	
White	Whole meal	955.4 μg GAE/g	n/a	n/a	Sharma S. et al., 2018
Blue		1159.6–1202.7	n/a	n/a	
Purple		1101.6–1223.0	n/a	n/a	
Black		1174.0–1186.7	n/a	n/a	
Blue	Outer bran	874.49 μg GAE/g	6862.68 μg GAE/g	n/a	Zhang et al., 2018
Purple		1139.79	6872.68	n/a	
Black		590.38	7679.60	n/a	
Blue	Coarse bran	476.41	4522.18	n/a	
Purple		636.35	5257.32	n/a	
Black		495.25	5179.15	n/a	
Blue	Shorts	450.15	3937.84	n/a	
Purple		433.49	3508.70	n/a	
Black		452.25	4195.39	n/a	
Red	Whole meal	21.74 mg GAE/100 g	192.38 mg GAE/100 g	n/a	Wang et al., 2020
Yellow		7.57	45.56	n/a	
Blue		13.49	134.23	n/a	
Purple		28.14	242.91	n/a	
Black		45.21	397.58	n/a	
Blue	Flour	n/a	n/a	0.93 mg FAE/g	Iannucci et al., 2022
Purple		n/a	n/a	0.80–0.90	
Blue	Bran	n/a	n/a	9.05	
Purple		n/a	n/a	5.84–7.28	
Blue	Whole meal	n/a	n/a	2.23	
Purple		n/a	n/a	1.50–2.47	
Red	Whole meal	188.62–271.05 mg GAE/100g	226.76–487.21 mg GAE/100g	445.68–708.25 mg GAE/100g	Shamanin et al., 2022
Blue		204.38–246.89	252.62–519.89	457.00–766.74	
Purple		164.03–247.70	188.62–565.62	352.65–771.83	
Black		190.31–217.65	258.80–322.97	475.99–520.28	
Yellow	Bran	n/a	n/a	99.17 mg TAE/100 g	Saini et al., 2023
Purple		n/a	n/a	177.75–188.32	
Yellow	Flour	n/a	n/a	82.21	
Purple		n/a	n/a	153.44–160.26	
Red	Whole meal	106 mg/kg	931 mg/kg	n/a	Sardella et al., 2023
Yellow		126	916	n/a	
Blue		111–165	842–1073	n/a	
Purple		133–146	831–992	n/a	
Black		153–155	1041–1066	n/a	

TPC – total phenolic content, CE – catechin equivalent, GAE – gallic acid equivalent, FAE – ferulic acid equivalent, TAE – tannic acid equivalent.

Таблица S5. Показатели антиоксидантной активности зерна пшеницы с различной окраской

Wheat color	Part of grain	TAA			Reference
		DPPH	ABTS	Other	
Blue	Bran	2.11 TE mmol/100 g	n/a	n/a	Siebenhandl et al., 2007
Purple	Bran + shorts	1.91	n/a	n/a	
Blue	Shorts	1.75	n/a	n/a	
Purple	Whole meal	0.63	n/a	n/a	
Blue	Flour	0.39	n/a	n/a	
Purple		0.47	n/a	n/a	
Red	Whole meal (*T. durum*)	n/a	14.23–15.57 mmol TE/kg	n/a	Ficco et al., 2014
Blue	Whole meal	n/a	24.11	n/a	
Purple	Whole meal (*T. durum*)	n/a	20.53–24.61	n/a	
White	Whole meal	n/a	10.0 µmol TE/g	31.7 µmol $FeSO_4$/g (FRAP)	Li et al., 2015
Purple		n/a	9.5–9.8	28.1–28.2	
Black		n/a	9.9	35.9	
White	Whole meal	n/a	12.67–12.80 µmol TE/g	10.55–10.79 µmol $FeSO_4$/g (FRAP)	Ma et al., 2016
Red		n/a	12.72–13.00	11.39–12.29	
Purple		n/a	14.08–14.35	13.56–15.73	
Purple	Whole meal	3.1 mmol TE/g	1.3 mmol TE/g	0.55 mmol TE/g (ORAC)	Abdel-Aal et al., 2018
	Bran	6.7	2.6	1.05	
White	Whole meal	9.4 Ppm TE	58.8 Ppm TE	139 ppm Asc (PCL)	Sharma S. et al., 2018
Blue		13.3–14.2	93.6–97.5	487–775	
Purple		14.3–14.8	75.2–78.1	325–572	
Black		15.1–16.0	86.7–86.9	728–930	
Red	Whole meal	mmol TE/kg 226.55	mmol TE/kg 105.24	n/a	Wang et al., 2020
Yellow		89.93	38.90	n/a	
Blue		159.66	71.56	n/a	
Purple		273.40	134.64	n/a	
Black		450.92	219.31	n/a	
Blue	Flour	8.35	2.13	n/a	Iannucci et al., 2022
Purple		8.03–8.14 µmol TE/g	µmol TE/g 1.67–1.68	n/a	
Blue	Bran	36.37	22.27	n/a	
Purple		29.56–33.21	12.99–15.88	n/a	
Blue	Whole meal	9.64	2.70	n/a	
Purple		8.47–9.95	1.70–1.75	n/a	
red	Whole meal	Free (AA%) 47.9–59.5 / Bound (AA%) 47.7–61.9	n/a	n/a	Shamanin et al., 2022
Blue		53.6–57.8 / 62.2–62.2	n/a	n/a	
Purple		39.7–56.7 / 42.6–61.2	n/a	n/a	
Black		48.0–54.4 / 50.2–57.6	n/a	n/a	

Окончание табл. S5

Wheat color	Part of grain	TAA			Reference
		DPPH	ABTS	Other	
Yellow	Bran	4.05 mmol TE/kg	n/a	n/a	Saini et al., 2023
Purple		7.83–9.44	n/a	n/a	
Yellow	Flour	2.04	n/a	n/a	
Purple		3.12–3.81	n/a	n/a	
Red	Whole meal	n/a	16 mmol TE/kg	10 mmol TE/kg (FRAP)	Sardella et al., 2023
Yellow		n/a	16.8	10.2	
Blue		n/a	15.5–17.1	10.3–10.6	
Purple		n/a	15–17.4	10.2–12.2	
Black		n/a	16.7	11.7–11.9	
Red	Whole meal	n/a	63.44–188.97 mg TE/100 g	144.54–333.60 mg TE/100 g (CUPRAC)	Shamanin et al., 2024
Blue		n/a	62.03–77.09	289.80–401.87	
Purple		n/a	61.86–320.97	107.73–315.73	
Black		n/a	96.31–290.81	175.20–483.73	

TAA – total antioxidant activity, Asc – ascorbic acid equivalent, TE – trolox equivalent, ABTS – 2.2′-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) method, DPPH – 2.2-diphenyl1-picrylhydrazyl test, PCL – chemiluminescence, FRAP – ferric reducing antioxidant power, ORAC – oxygen radical absorbance capacity.

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