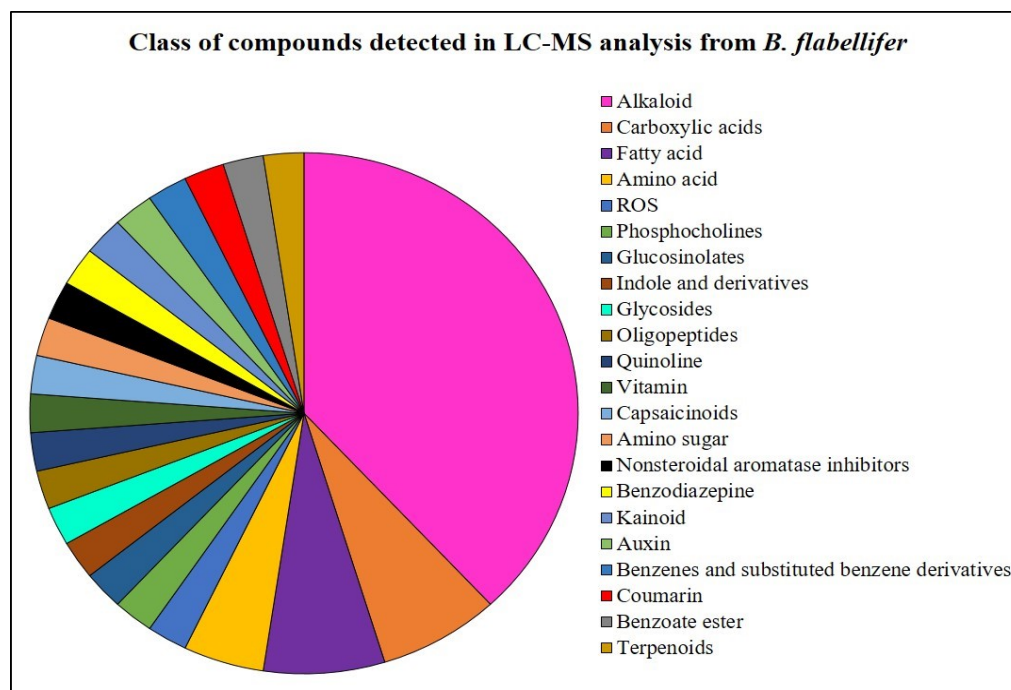


SUPPLEMENTARY DATA:



Suppl. Fig. 1: Graphical representation of the different classes of metabolites extracted and identified using LC-MS from tender fruit endosperm of *Borassus flabellifer* using methanol as solvent

S. Table 1: List of proteins detected from pulp part of green *B. flabellifer* analyzed by LC-MS/MS using 100 mM of phosphate buffer, pH 7.6 and trypsin digested.

S.No	Protein	Score	Accession	Function	Reference
1	Chaperone protein ClpB3, chloroplastic	50	CLPB3_ARATH	*Molecular chaperone essential for chloroplast development and seedling viability. *Mediates internal thylakoid membrane formation and confers thermo tolerance to chloroplasts during heat stress.	https://www.uniprot.org/uniprotkb/Q9LF37/entry
2	protein translocase subunit SecA, chloroplastic	48	SECA_OSTLU	*Has a central role in coupling the hydrolysis of ATP to the transfer of proteins across the thylakoid membrane.	https://www.uniprot.org/uniprotkb/A4RW83/entry
3	Signal recognition particle 54 kDa protein 2	47	SR542_ARATH	*Binds to the signal sequence of presecretory protein when they emerge from the ribosomes and transfers them to TRAM (translocating chain-associating membrane) protein	https://www.uniprot.org/uniprotkb/P49966/entry
4	Germacrene A oxidase	46	GAO_LACSA	Involved in the biosynthesis of germacrene-derived sesquiterpene lactones.	https://www.uniprot.org/uniprotkb/D5J9U8/entry
5	Flotillin-like protein 2	46	FLOT2_MEDTR	*May act as a scaffolding protein within caveolar membranes, functionally participating in formation of caveolae or caveolae-	https://www.uniprot.org/uniprotkb/D2XNQ9/entry

				like vesicles (By similarity). *Required for early symbiotic events and nodules formation	
6	G2/mitotic-specific cyclin-1 (Fragment)	45	CCNB1_MEDSA	Essential for the control of the cell cycle at the G2/M (mitosis) transition	https://www.uniprot.org/uniprotkb/P30286/entry
7	NAC domain-containing protein 74	44	NAC74_ORYSJ	*Transcription activator involved in heat and endoplasmic reticulum (ER) stress responses *Regulates the expression of genes involved in ER protein folding and heat stress-responsive genes *Binds directly to the promoter of BZIP74 and regulates its expression in response to heat stress	https://www.uniprot.org/uniprotkb/Q7GCL7/entry
8	Probable linoleate 9S-lipoxygenase 4	44	LOX4_ORYSJ	* may be involved in a number of diverse aspects of plant physiology including growth and development, pest resistance, and senescence or responses to wounding. *Catalyzes the hydroperoxidation of lipids containing a cis,cis-1,4-pentadiene structure	https://www.uniprot.org/uniprotkb/Q53RB0/entry
9	Cinnamoyl-CoA reductase 1	44	CCR1_ARATH	Catalyzes one of the last steps of monolignol biosynthesis, the conversion of cinnamoyl-CoAs into their corresponding cinnamaldehydes.	https://www.uniprot.org/uniprotkb/Q9S9N9/entry
10	DEAD-box ATP-dependent RNA helicase 47	44	RH47_ARATH	*Essential protein required during embryogenesis. Required for mitochondrial metabolism. *Necessary for normal plasmodesmata (PD) development and aperture regulation.	https://www.uniprot.org/uniprotkb/Q8W4E1/entry
11	Catalase isozyme 2	44	CATA2_SOLLC	Occurs in almost all aerobically respiring organisms and serves to protect cells from the toxic effects of hydrogen peroxide.	https://www.uniprot.org/uniprotkb/Q9XHH3/entry
12	Chalcone synthase 2	44	CHS2_MEDSA	The primary product of this enzyme is 4,2',4',6'-tetrahydroxychalcone (also termed naringenin-chalcone or chalcone) which can under specific conditions spontaneously isomerize into naringenin.	https://www.uniprot.org/uniprotkb/P30074/entry
13	Myb-related protein Hv1	43	MYB1_HORVU	*Possible transcription activator in response to an external signal. *May be involved in the regulation of flavonoid biosynthesis	https://www.uniprot.org/uniprotkb/P20026/entry
14	Probable mannan synthase 10	43	CSLAA_ARATH	Probable mannan synthase which consists of a 4-beta-mannosyltransferase activity on mannan using GDP-mannose.	https://www.uniprot.org/uniprotkb/Q9LR87/entry
15	Alpha,alpha-trehalose-phosphate synthase [UDP-forming] 5	43	TPS5_ARATH	2-deoxyglucose, but not phenformin, enhances the phosphorylation of TPS5.	https://www.uniprot.org/uniprotkb/O23617/entry
16	Putative pumilio homolog 10	42	PUM10_ARATH	Sequence-specific RNA-binding protein that regulates translation and mRNA stability by binding the 3'-UTR of target mRNAs.	https://www.uniprot.org/uniprotkb/Q9LP21/entry
17	Oxygen-evolving enhancer protein 2-1,	42	PSBP1_ARATH	May be involved in the regulation of photosystem II.	https://www.uniprot.org/uniprotkb/Q9LR87/entry

	chloroplastic				protkb/Q42029/en try
18	Protein disulfide isomerase-like 1-3	42	PID13_ORYSJ	Acts as a protein-folding catalyst that interacts with nascent polypeptides to catalyze the formation, isomerization, and reduction or oxidation of disulfide bonds. May play a role in storage protein biogenesis	https://www.uniprot.org/uniprotkb/Q69ST6/entry
19	FACT complex subunit SSRP1	41	SSRP1_VICFA	The FACT complex is involved in multiple processes that require DNA as a template such as mRNA elongation, DNA replication and DNA repair.	https://www.uniprot.org/uniprotkb/O04235/entry
20	Glycine-rich protein GWK	40	GRP1_CUCME	Possesses antifungal activity against a number of phytopathogenic fungi, including <i>H. sativum</i> and <i>F.culmorum</i>	https://www.uniprot.org/uniprotkb/P84064/entry
21	ATPase 8, plasma membrane-type	40	PMA8_ARATH	The plasma membrane H ⁺ ATPase of plants and fungi generates a proton gradient that drives the active transport of nutrients by H ⁺ -symport.	https://www.uniprot.org/uniprotkb/Q9M2A0/entry
22	Membrin-11	40	MEM11_ARATH	Involved in transport of proteins from the cis/medial-Golgi to the trans-Golgi network.	https://www.uniprot.org/uniprotkb/Q9SJL6/entry
23	Mitochondrial import inner membrane translocase subunit TIM23-3	40	TI233_ARATH	*Essential component of the TIM17:23 complex, a complex that mediates the translocation of transit peptide-containing proteins across the mitochondrial inner membrane. *Links the inner and outer membranes	https://www.uniprot.org/uniprotkb/Q9S837/entry
24	BTB/POZ domain-containing protein At3g50840	47	Y3084_ARATH	May act as a substrate-specific adapter of an E3 ubiquitin-protein ligase complex (CUL3-RBX1- BTB) which mediates the ubiquitination and subsequent proteasomal degradation of target proteins.	https://www.uniprot.org/uniprotkb/Q8LPQ3/entry
25	Probable pectate lyase 19	46	PLY19_ARATH	Eliminative cleavage of (1->4)-alpha-D -galacturonan to give oligosaccharides with 4-deoxy-alpha- D-galact-4-enuronosyl groups at their non-reducing ends.	https://www.uniprot.org/uniprotkb/Q9LFP5/entry
26	Retinoblastoma-related protein 3	46	RBR3_MAIZE	May play a role in the entry into mitosis, negatively regulating the cell proliferation.	https://www.uniprot.org/uniprotkb/Q3LXA7/entry
27	Antiviral protein MAP	45	RIPP_MIRJA	Inhibits viral infection of plants, and protein synthesis in vitro.	https://www.uniprot.org/uniprotkb/P21326/entry
28	Serine carboxypeptidase II-2 (Fragment)	45	CBP22_HORVU	Preferential release of a C-terminal arginine or lysine residue.	https://www.uniprot.org/uniprotkb/P55748/entry
29	Probable carboxylesterase 9	44	CXE9_ARATH	Carboxylesterase acting on esters with varying acyl chain length.	https://www.uniprot.org/uniprotkb/O64641/entry
30	30S ribosomal protein S8, chloroplastic	44	RR8_NEPOL	One of the primary rRNA binding proteins, it binds directly to 16S rRNA central domain where it helps coordinate assembly of the platform of the 30S subunit.	https://www.uniprot.org/uniprotkb/Q9TL24/entry

31	Hexokinase-3	44	HXK3_ORYSJ	Fructose and glucose phosphorylating enzyme.	https://www.uniprot.org/uniprotkb/Q2KNB4/entry
32	Phenylalanine ammonia-lyase	44	PALY_WHEAT	Key enzyme of plant metabolism catalyzing the first reaction in the biosynthesis from L-phenylalanine of a wide variety of natural products based on the phenylpropane skeleton	https://www.uniprot.org/uniprotkb/Q43210/entry
33	Putative geranylgeranyl pyrophosphate synthase 8, chloroplastic	44	GGPP8_ARATH	Catalyzes the trans-addition of the three molecules of IPP onto DMAPP to form geranylgeranyl pyrophosphate	https://www.uniprot.org/uniprotkb/Q9LRR0/entry
34	6-phosphogluconate dehydrogenase, decarboxylating	44	6PGD1_ORYSJ	Catalyzes the oxidative decarboxylation of 6-phosphogluconate to ribulose 5-phosphate and CO ₂ , with concomitant reduction of NADP to NADPH	https://www.uniprot.org/uniprotkb/Q9LI00/entry
35	Putative cellulose synthase A catalytic subunit 11 [UDP-forming]	44	CESAB_ORYSJ	Catalytic subunit of cellulose synthase terminal complexes ('rosettes'), required for beta-1,4-glucan microfibril crystallization, a major mechanism of the cell wall formation.	https://www.uniprot.org/uniprotkb/Q69XK5/entry
36	ABC transporter G family member 32	42	AB32G_ARATH	*May be a general defense protein (By similarity). *Required for the formation of the cuticle layer of the cell wall	https://www.uniprot.org/uniprotkb/O81016/entry
37	DEMETER-like protein 2	41	DML2_ARATH	Potential transcriptional activator that may act by nicking the target promoter.	https://www.uniprot.org/uniprotkb/Q9SR66/entry
38	Serpin-Z2B	41	SPZ2B_ORYSJ	Probable serine protease inhibitor	https://www.uniprot.org/uniprotkb/Q53KS9/entry
39	Protein TIFY 8	41	TIF8_ARATH	Repressor of jasmonate responses.	https://www.uniprot.org/uniprotkb/Q84MB2/entry
40	Cytochrome P450 78A5	41	C78A5_ARATH	*Plays a role in regulating directional growth at the meristem/organ boundary. * Functions probably in association with CYP78A7 in regulating relative growth of the shoot apical meristem and plant organs. Is required locally in developing ovules to stimulate cell proliferation and promote seed growth.	https://www.uniprot.org/uniprotkb/Q9LMX7/entry
41	Copalyl diphosphate synthase 2	41	TPS10_SELML	Monofunctional diterpene synthase converting geranylgeranyl diphosphate to copalyl diphosphate.	https://www.uniprot.org/uniprotkb/J9R388/entry
42	Ribulose biphosphate carboxylase large chain	41	RBL_NEPOL	*RuBisCO catalyzes two reactions: the carboxylation of D-ribulose 1,5-bisphosphate, the primary event in carbon dioxide fixation, as well as the oxidative fragmentation of the pentose substrate in the photorespiration process. *Both reactions occur simultaneously and in competition at the same active site.	https://www.uniprot.org/uniprotkb/Q9T4F2/entry
43	Indole-3-acetate O-methyltransferase 1	41	IAMT1_ARATH	*Catalyzes the methylation of the free carboxyl end of the plant hormone indole-3-acetic acid (IAA).	https://www.uniprot.org/uniprotkb/Q9FLN8/entry

				*Regulates IAA activities by IAA methylation.	
44	Long-chain-fatty acid-- [acyl-carrier-protein] ligase AEE15, chloroplastic	41	AAE15_ARATH	Probably involved in the activation of fatty acids to acyl-carrier-protein prior to fatty acid elongation in plastids.	https://www.uniprot.org/uniprotkb/Q8W471/entry
45	Nuclear-pore anchor	40	NUA_ARATH	Plays a role in meristematic cell division by interacting with spindle assembly checkpoint protein	https://www.uniprot.org/uniprotkb/A4GSN8/entry
46	Serine/threonine-protein kinase SRK2I	40	SRK2I_ARATH	In response to ABA, phosphorylates the ESCRT-I complex component FREE1, which is required for ABA-induced FREE1 nuclear import	https://www.uniprot.org/uniprotkb/Q39193/entry
47	Ubiquinol oxidase 2, mitochondrial	40	AOX2_ARATH	May increase respiration when the cytochrome respiratory pathway is restricted, or in response to low temperatures	https://www.uniprot.org/uniprotkb/O22049/entry

S. Table 2: List of proteins detected from pulp part of black *B. flabellifer* analyzed by LC-MS/MS using 100 mM of phosphate buffer, pH 7.6 and trypsin digested.

S.No	Protein	Score	Accession	Function	Reference
1	Aluminum-activated malate transporter 1	56	ALMT1_ARATH	Malate transporter critical for aluminum tolerance. The STOP1 transcription factor is required for ALMT1 expression.	https://www.uniprot.org/uniprotkb/Q9SJE9/entry
2	Protein MADS AFFECTING FLOWERING 5	49	MAF5_ARATH	*Transcription factor involved in the negative regulation of flowering time in short days, probably through the photoperiodic and vernalization pathways.	https://www.uniprot.org/uniprotkb/Q683D7/entry
3	Electron transfer flavoprotein-ubiquinone oxidoreductase, mitochondrial	48	ETFQO_ORYSJ	Accepts electrons from ETF and reduces ubiquinone.	https://www.uniprot.org/uniprotkb/Q337B8/entry
4	Oleosin GRP-17	47	GRP17_ARATH	Lipid-binding oleosin pollen coat protein required to mediate pollen recognition by stigma cells and subsequent pollen hydration	https://www.uniprot.org/uniprotkb/Q9LY09/entry
5	Uncharacterized mitochondrial protein AtMg01230	47	M1230_ARATH	A stretch of 270 kb of the mitochondrial genome is duplicated within the centromere of chromosome 2 resulting in the duplication of the gene. The expression of the duplicated gene (At2g07697) is not demonstrated.	https://www.uniprot.org/uniprotkb/P92553/entry
6	Leghemoglobin-1	46	LGB1_VICFA	Provides oxygen to the bacteroids. This role is essential for symbiotic nitrogen fixation.	https://www.uniprot.org/uniprotkb/P02232/entry

7	ATP-dependent zinc metalloprotease FTSH 10, mitochondrial	45	FTSHA_ARATH	Probable ATP-dependent zinc metallopeptidase. Involved in the assembly and/or stability of the complexes I and V of the mitochondrial oxidative phosphorylation system.	https://www.uniprot.org/uniprotkb/Q8VZI8/entry
8	CBL-interacting protein kinase 30	44	CIPKU_ORYSJ	CIPK serine-threonine protein kinases interact with CBL proteins. Binding of a CBL protein to the regulatory NAF domain of CIPK protein lead to the activation of the kinase in a calcium-dependent manner	https://www.uniprot.org/uniprotkb/Q5JLQ9/entry
9	Nitrate reductase [NADH], clone PBNBR1405	43	NIA1_BRANA	Nitrate reductase is a key enzyme involved in the first step of nitrate assimilation in plants, fungi and bacteria.	https://www.uniprot.org/uniprotkb/P39867/entry
10	Expansin-A3	43	EXPA3_ARATH	Causes loosening and extension of plant cell walls by disrupting non-covalent bonding between cellulose microfibrils and matrix glucans. No enzymatic activity has been found	https://www.uniprot.org/uniprotkb/O80932/entry
11	CMP-sialic acid transporter 3	43	CSTR3_ARATH	Sugar transporter involved in the transport of CMP-sialic acid from the cytoplasm into the Golgi.	https://www.uniprot.org/uniprotkb/Q9C5H6/entry
12	Ribonuclease 3-like protein 3	42	RTL3_ARATH	Ribonuclease that cleaves double-stranded RNA (dsRNA).	https://www.uniprot.org/uniprotkb/Q9FKF0/entry
13	ATP synthase subunit beta, chloroplastic	42	ATPB_DIOEL	Produces ATP from ADP in the presence of a proton gradient across the membrane. The catalytic sites are hosted primarily by the beta subunits.	https://www.uniprot.org/uniprotkb/A6MML4/entry
14	CSC1-like protein At1g32090	42	CSCL1_ARATH	Acts as an osmosensitive calcium-permeable cation channel.	https://www.uniprot.org/uniprotkb/Q9FVQ5/entry
15	Protein-tyrosine-phosphatase MKP1	42	MKP1_ARATH	*May be involved in salt and genotoxic stress responses. *Involved in UV-B stress tolerance.	https://www.uniprot.org/uniprotkb/Q9C5S1/entry
16	Nudix hydrolase 21, chloroplastic	41	NUD21_ARATH	Probably mediates the hydrolysis of some nucleoside diphosphate derivatives.	https://www.uniprot.org/uniprotkb/Q8VY81/entry
17	PHD finger protein ALFIN-LIKE 2	41	ALFL2_ARATH	Histone-binding component that specifically recognizes H3 tails trimethylated on 'Lys-4' (H3K4me3), which mark transcription start sites of virtually all active genes.	https://www.uniprot.org/uniprotkb/Q9SRM4/entry
18	Polygalacturonate-4-alpha-galacturonosyltransferase	41	GAUT1_ARATH	*Involved in pectin biosynthesis. Catalyzes the transfer of galacturonic acid from uridine *5'-diphosphogalacturonic acid onto the pectic polysaccharide homogalacturonan.	https://www.uniprot.org/uniprotkb/Q9LE59/entry
19	EPIDERMAL PATTERNING FACTOR-like protein 8	41	EPFL8_ARATH	Controls stomatal patterning.	https://www.uniprot.org/uniprotkb/Q1G3V9/entry
20	Ethylene-responsive transcription factor WIN1	40	WIN1_ARATH	*Promotes cuticle formation by inducing the expression of enzymes involved in wax biosynthesis *May be involved in the regulation of gene expression by stress factors and by components of stress signal transduction pathways	https://www.uniprot.org/uniprotkb/Q9XI33/entry

21	ABC transporter G family member 40	40	AB40G_ARATH	*May be a general defense protein *Functions as a pump to exclude Pb ²⁺ ions and/or Pb ²⁺ -containing toxic compounds from the cytoplasm. Contributes to Pb ²⁺ ions resistance.	https://www.uniprot.org/uniprotkb/Q9M9E1/entry
22	Protein argonaute 13	40	AGO13_ORYSJ	Probably involved in the RNA silencing pathway. May bind to short RNAs such as microRNAs (miRNAs) or short interfering RNAs (siRNAs), and represses the translation of mRNAs which are complementary to them	https://www.uniprot.org/uniprotkb/Q852N2/entry
23	ADP-ribosylation factor GTPase-activating protein AGD3	47	AGD3_ARATH	*Involved in the spatial control of provascular differentiation. Required for the formation of the normal pattern of continuous secondary veins. *Involved in auxin signaling but not in polar auxin transport or in auxin responses.	https://www.uniprot.org/uniprotkb/Q5W7F2/entry
24	Nitrate reductase [NAD(P)H]	47	NIA7_HORVU	Nitrate reductase is a key enzyme involved in the first step of nitrate assimilation in plants, fungi and bacteria.	https://www.uniprot.org/uniprotkb/P27968/entry
25	Metal-nicotianamine transporter YSL1	46	YSL1_ARATH	Involved in iron loading of the seeds. Acts probably as a transporter of iron- a metal-nicotianamine chelates.	https://www.uniprot.org/uniprotkb/Q6R3L0/entry
26	Serine protease inhibitor 2	45	SPI2_SOLTU	Protects the plant by inhibiting proteases of invading organisms, decreasing both hyphal growth and zoospores germination of <i>Phytophthora infestans</i> .	https://www.uniprot.org/uniprotkb/P58515/entry
27	Twinkle homolog protein, chloroplastic/ mitochondrial	45	TWIH_ARATH	*Has both DNA primase and DNA helicase activities and may be involved in organelle DNA replication. *Capable of producing RNA primers of 9 to 18 bases from a single-stranded DNA template.	https://www.uniprot.org/uniprotkb/B5X582/entry
28	Glutaredoxin-C 8	44	GRXC8_ARATH	Has a glutathione-disulfide oxidoreductase activity in the presence of NADPH and glutathione reductase. Reduces low molecular weight disulfides and proteins	https://www.uniprot.org/uniprotkb/Q8LF89/entry
29	DEAD-box ATP-dependent RNA helicase 30	43	RH30_ARATH	ATP-dependent RNA helicase involved nonsense-mediated mRNA decay and ribosome biogenesis through rRNA processing.	https://www.uniprot.org/uniprotkb/Q8W4R3/entry
30	Transcription factor HBI1	43	HBI1_ARATH	Transcriptional activity is inhibited when binding to the bHLH transcription factor IBH1.	https://www.uniprot.org/uniprotkb/Q9ZPW3/entry
31	Chaperone protein ClpB3, mitochondrial	43	CLPB3_ORYSJ	Molecular chaperone that may not be involved in heat stress response or tolerance.	https://www.uniprot.org/uniprotkb/Q0E3C8/entry
32	Serine hydroxymethyltransferase 1, mitochondrial	42	GLYM1_ARATH	Functions in the photorespiratory pathway in catalyzing the interconversion of serine and glycine. Involved in controlling cell damage caused by abiotic stress,	https://www.uniprot.org/uniprotkb/Q9SZJ5/entry
33	DNA-directed RNA polymerase subunit beta	42	RPOC1_CHAVU	DNA-dependent RNA polymerase catalyzes the transcription of DNA into RNA using the four ribonucleoside triphosphates as substrates.	https://www.uniprot.org/uniprotkb/Q1ACN5/entry
34	Anoctamin-like protein	41	CACLC_ORYSJ	May act as a calcium-activated chloride channel.	https://www.uniprot.org/uniprotkb/Q1ACN5/entry

	Os01g0706700				protkb/Q0JJZ6/entry
35	Auxin response factor 16	41	ARFP_ORYSI	Auxin response factors (ARFs) are transcriptional factors that bind specifically to the DNA sequence 5'-TGTCTC-3' found in the auxin-responsive promoter elements (AuxREs).	https://www.uniprot.org/uniprotkb/A2YAA5/entry
36	Auxin response factor 11	41	ARFK_ARATH	*Auxin response factors (ARFs) are transcriptional factors that bind specifically to the DNA sequence 5'-TGTCTC-3' found in the auxin-responsive promoter elements (AuxREs). *Could act as transcriptional activator or repressor.	https://www.uniprot.org/uniprotkb/Q9ZPY6/entry
37	Calnexin homolog	40	CALX_SOYBN	*Calcium-binding protein that interacts with newly synthesized monoglucosylated glycoproteins in the endoplasmic reticulum. *It may act in assisting protein assembly and/or in the retention within the ER of unassembled protein subunits.	https://www.uniprot.org/uniprotkb/Q39817/entry
38	Succinate-semialdehyde dehydrogenase, mitochondrial	40	SSDH_ORYSJ	Oxidizes specifically succinate semialdehyde. Involved in plant response to environmental stress by preventing the accumulation of reactive oxygen species	https://www.uniprot.org/uniprotkb/B9F3B6/entry
39	9-cis-epoxycarotenoid dioxygenase NCED3, chloroplastic	40	NCED3_ARATH	Catalyzes the first step of abscisic-acid biosynthesis from carotenoids, in response to water stress.	https://www.uniprot.org/uniprotkb/Q9LRR7/entry
40	LRR receptor-like serine/threonine-protein kinase ERECTA	40	ERECT_ARATH	*Forms a functional ligand-receptor pair with EPF2 (ACQ8LC53) *Modulates plant transpiration efficiency by controlling stomatal density, leaf photosynthetic capacity, epidermal cell expansion, mesophyll cell proliferation and cell-cell contact.	https://www.uniprot.org/uniprotkb/Q42371/entry
41	MLO-like protein 1	40	MLO1_ARATH	May be involved in modulation of pathogen defense and leaf cell death. Activity seems to be regulated by Ca ²⁺ -dependent calmodulin binding and seems not to require heterotrimeric G proteins	https://www.uniprot.org/uniprotkb/O49621/entry
42	Small RNA degrading nuclease 1	40	SDN1_ARATH	3'-5' exonuclease degrading single-stranded small RNAs	https://www.uniprot.org/uniprotkb/A3KPE8/entry
43	Oleosin GRP-17	40	GRP17_ARATH	*Lipid-binding oleosin pollen coat protein required to mediate pollen recognition by stigma cells and subsequent pollen hydration *Also implicated in the formation of pollen coat	https://www.uniprot.org/uniprotkb/Q9LY09/entry
44	Pentatricopeptide repeat-containing protein At5g15300	40	GRP17_ARATH	*Lipid-binding oleosin pollen coat protein required to mediate pollen recognition by stigma cells and subsequent pollen hydration *Also implicated in the formation of pollen coat	https://www.uniprot.org/uniprotkb/Q9LY09/entry
45	Chaperonin 60 subunit beta 3, chloroplastic	40	CPNB3_ARATH	Involved in protein assisted folding.	https://www.uniprot.org/uniprotkb/C0Z361/entry

S. Table 3: List of proteins detected from shell part of green *B. flabellifer* analyzed by LC-MS/MS using 100 mM of phosphate buffer, pH 7.6 and trypsin digested.

S.No	Protein	Score	Accession	Function	Reference
1	Superoxide dismutase [Mn] 3.1, mitochondrial	54	SODM1_MAIZE	Destroys superoxide anion radicals which are normally produced within the cells and which are toxic to biological systems.	https://www.uniprot.org/uniprotkb/P09233/entry
2	Glutamate receptor 3.4	52	GLR34_ARATH	*Acts as negative regulator of lateral root initiation and development *May restrict primordia numbers and position along the root axis by a signaling process originating in the phloem	https://www.uniprot.org/uniprotkb/Q8GXJ4/entry
3	Cation/calcium exchanger 3	48	CCX3_ARATH	Endomembrane-localized H ⁺ -dependent K ⁺ and Na ⁺ transporter. May have a function associated with the pollen vacuole during tube elongation and polarized top growth.	https://www.uniprot.org/uniprotkb/Q9LJI2/entry
4	Copper-transporting ATPase RAN1	48	HMA7_ARATH	Involved in copper import into the cell. Essential for ethylene signaling, which requires copper. Acts by delivering copper to create functional hormone receptors.	https://www.uniprot.org/uniprotkb/Q9S7J8/entry
5	Prohibitin-5, mitochondrial	46	PHB5_ARATH	Prohibitin probably acts as a holdase/unfold ase for the stabilization of newly synthesized mitochondrial proteins.	https://www.uniprot.org/uniprotkb/Q9LY99/entry
6	Chromatin structure-remodeling complex protein BSH	45	BSH_ARATH	It changes chromatin structure by altering DNA-histone contacts within a nucleosome, leading eventually to a change in nucleosome position, thus facilitating or repressing binding of gene-specific transcription factors.	https://www.uniprot.org/uniprotkb/P93045/entry
7	Dynamamin-related protein 5A	44	DRP5A_ARATH	Probable microtubule-associated force-producing protein that is targeted to the forming cell plate during cytokinesis. May play a role in cell division	https://www.uniprot.org/uniprotkb/F4HPR5/entry
8	Protein phosphatase 2C 32	44	P2C32_ARATH	Involved in the regulation of pedicel length and of CLAVATA pathways controlling stem cell identity at shoot and flower meristems.	https://www.uniprot.org/uniprotkb/Q8RWN7/entry
9	1-phosphatidylinositol-3-phosphate 5-kinase FAB1B	44	FAB1B_ARATH	*Plays an important role in maintenance of endomembrane homeostasis including endocytosis, vacuole formation, and vacuolar acidification processes. *Required for development of viable pollen. Might mediate recycling of auxin transporters	https://www.uniprot.org/uniprotkb/Q9LUM0/entry
10	UDP-glycosyltransferase 89A2	43	U89A2_ARATH	Glucosyltransferase that glucosylates benzoates and benzoate derivatives in vitro.	https://www.uniprot.org/uniprotkb/Q9LZD8/entry
11	Photosystem II reaction center protein K	43	PSBK_STAPU	Converts photonic excitation into a charge separation.	https://www.uniprot.org/uniprotkb/Q32RW6/entry
12	Ninja-family protein Os03g0214200	43	NNJA1_ORYSJ	Mediates deactivation and degradation of BZIP46, a positive regulator of ABA signaling and drought stress tolerance. Promotes BZIP46 degradation via interaction with the U-box type ubiquitin E3 ligase PUB70.	https://www.uniprot.org/uniprotkb/Q10Q07/entry

13	Protein RALF-like 10	41	RLF10_ARATH	Cell signaling peptide that may regulate plant stress, growth, and development.	https://www.uniprot.org/uniprotkb/O65919/en try
14	Probable metal-nicotian amine transporter YSL16	41	YSL16_ORYSJ	May be involved in the transport of nicotianamine- chelated metals.	https://www.uniprot.org/uniprotkb/Q7XN54/entry
15	Glutamate--cysteine ligase, chloroplastic	40	GSH1_ARATH	Participates in the detoxification process, the antioxidant response and is essential for embryo development and proper seed maturation.	https://www.uniprot.org/uniprotkb/P46309/entry

S. Table 4: List of proteins detected from shell (mesocarp) part of black *B. flabellifer* analyzed by LC-MS/MS using 100 mM of phosphate buffer, pH 7.6 and trypsin digested.

S.No	Protein	Score	Accession	Function	Reference
1	CBL-interacting protein kinase 2	54	CIPK2_ORYSJ	CIPK serine-threonine protein kinases interact with CBL proteins. Binding of a CBL protein to the regulatory NAF domain of CIPK protein lead to the activation of the kinase in a calcium-dependent manner	https://www.uniprot.org/uniprotkb/Q7X996/en try
2	Polycomb group protein FIE1	52	FIE1_MAIZE	They probably act via the methylation of histones, rendering chromatin heritably changed in its expressibility	https://www.uniprot.org/uniprotkb/Q8VZY7/entry
3	Cold shock domain-containing protein 4	48	CSP4_ARATH	Regulates the flowering transition and flower and seed development, particularly at late stages of embryo development, through regulation of gene expression (including MEA, FIS2, AP1, CAL, AG and SHP2	https://www.uniprot.org/uniprotkb/Q38896/en try
4	ATP synthase 28 kDa subunit, mitochondrial (Fragment)	48	ATP7_SPIOL	During catalysis, ATP synthesis in the catalytic domain of F1 is coupled via a rotary mechanism of the central stalk subunits to proton translocation. Part of the complex F0 domain.	https://www.uniprot.org/uniprotkb/P80088/entry
5	Probable sucrose-phosphatase 3	46	SPP3_ORYSJ	Catalyzes the final step of sucrose synthesis	https://www.uniprot.org/uniprotkb/A3AZW5/entry
6	NADP-dependent D-sorbitol-6-phosphate dehydrogenase	45	S6PD_MALDO	Synthesizes sorbitol-6-phosphate, a key intermediate in the synthesis of sorbitol which is a major photosynthetic product in many members of the Rosaceae family.	https://www.uniprot.org/uniprotkb/P28475/entry
7	Ribulose bisphosphate carboxylase large chain (Fragment)	44	RBL_ANTLU	RuBisCO catalyzes two reactions: the carboxylation of D-ribulose 1,5-bisphosphate, the primary event in carbon dioxide fixation, as well as the oxidative fragmentation of the pentose substrate in the photorespiration process.	https://www.uniprot.org/uniprotkb/Q31672/entry

8	MLO protein homolog 1	44	MLOH1_HORVU	May be involved in modulation of pathogen defense and leaf cell death.	https://www.uniprot.org/uniprotkb/O49873/entry
9	ATPase 7, plasma membrane-type 6	44	PMA7_ARATH	The resulting external acidification and/or internal alkalinization may mediate growth responses	https://www.uniprot.org/uniprotkb/Q9LY32/entry
10	NAC domain-containing protein 12	43	NAC12_ARATH	May also regulate the secondary cell wall lignification of other tissues. Binds to and activates the promoter of MYB46.	https://www.uniprot.org/uniprotkb/Q9LPI7/entry
11	Guanine nucleotide-binding protein subunit beta	43	GBB_NICPL	Guanine nucleotide-binding protein (G proteins) are involved as a modulator or transducer in various transmembrane signaling systems.	https://www.uniprot.org/uniprotkb/P93339/entry
12	Non-specific lipid-transfer protein 10	43	NLTPA_ARATH	*Plant non-specific lipid-transfer proteins transfer phospholipids as well as galactolipids across membranes. *May play a role in wax or cutin deposition in the cell walls of expanding epidermal cells and certain secretory tissues	https://www.uniprot.org/uniprotkb/Q9LZV9/entry
13	Dynamamin-related protein 5A	41	DRP5A_ARATH	Probable microtubule-associated force-producing protein that is targeted to the forming cell plate during cytokinesis. May play a role in cell division.	https://www.uniprot.org/uniprotkb/F4HPR5/entry

S. Table 5: List of proteins detected from liquid (free nuclear endosperm) part of black *B. flabellifer* analyzed by LC-MS/MS using 100 mM of phosphate buffer, pH 7.6 and trypsin digested.

S.No	Protein	Score	Accession	Function	Reference
1	ATP-dependent zinc metalloprotease FTSH 6, chloroplastic	45	FTSH6_ORYSJ	Probable ATP-dependent zinc metalloprotease	https://www.uniprot.org/uniprotkb/Q67WJ2/entry
2	Serine protease inhibitor 7	44	SPI7_SOLTU	Inhibitor of trypsin (serine protease). May protect the plant by inhibiting proteases of invading organisms	https://www.uniprot.org/uniprotkb/P30941/entry
3	Homeobox-leucine zipper protein PROTODERMAL FACTOR 2	43	PDF2_ARATH	Involved, together with HDG proteins, in the regulation of flower organs development by promoting the expression of APETALA 3 (AP3) in the epidermis and internal cell layers of developing flowers	https://www.uniprot.org/uniprotkb/Q93V99/entry
4	Phosphatidylinositol/phosphatidylcholine transfer protein SFH10	42	SFH10_ARATH	Required for transport of secretory proteins from the Golgi complex. Catalyzes the transfer of phosphatidylinositol and phosphatidylcholine between membranes in vitro	https://www.uniprot.org/uniprotkb/Q9SI13/entry
5	Probable L-type lectin-domain containing receptor kinase I.2	42	LRK12_ARATH	Involved in resistance response to the pathogenic fungus <i>Alternaria brassicicola</i>	https://www.uniprot.org/uniprotkb/Q7FK82/entry
6	Probable anion transporter 2, chloroplastic	41	PHT42_ORYSJ	Probable anion transporter	https://www.uniprot.org/uniprotkb/Q53WP9/entry

7	Chaperone protein ClpB4, mitochondrial	41	CLPB4_ARATH	Molecular chaperone that does not seem to be involved in heat stress response or tolerance	https://www.uniprot.org/uniprotkb/Q8VYJ7/entry
8	Eukaryotic translation initiation factor 4G	40	IF4G_ARATH	Component of the protein complex eIF4F, which is involved in the recognition of the mRNA cap, ATP-dependent unwinding of 5'-terminal secondary structure and recruitment of mRNA to the ribosome.	https://www.uniprot.org/uniprotkb/Q76E23/entry
9	Protein HUA2-LIKE 2	40	HUAL2_ARATH	Plays diverse and essential roles in the control of plant development, physiology and flowering time	https://www.uniprot.org/uniprotkb/F4IN78/entry
10	50S ribosomal protein L1, chloroplastic	40	RK1_PEA	This protein binds directly to 23S ribosomal RNA	https://www.uniprot.org/uniprotkb/P49208/entry
11	Pentatricopeptide repeat-containing protein At3g49170, chloroplastic	40	PP272_ARATH	May play a role in embryogenesis	https://www.uniprot.org/uniprotkb/Q5G1T1/entry
12	Golgin candidate 6	39	GOGC6_ARATH	Golgi matrix protein playing a role in tethering of vesicles to Golgi membranes and in maintaining the overall structure of the Golgi apparatus	https://www.uniprot.org/uniprotkb/B0F9L4/entry
13	NAP1-related protein 2	39	NRP2_ORYSJ	Acts as histone H2A/H2B chaperone in nucleosome assembly	https://www.uniprot.org/uniprotkb/Q69JW2/entry
14	Elongator complex protein 4	39	ELP4_ARATH	Involved in the repression of the abscisic acid (ABA) signaling pathway during seed germination and seedling growth. Required for auxin distribution or signaling.	https://www.uniprot.org/uniprotkb/Q9C778/entry
15	Glycine-rich cell wall structural protein	39	GRP1_ARATH	Responsible for plasticity of the cell wall.	https://www.uniprot.org/uniprotkb/P27483/entry
16	Protein-L-isoaspartate O-methyltransferase	39	PIMT_WHEAT	It plays a role in the repair and/or degradation of damaged proteins.	https://www.uniprot.org/uniprotkb/Q43209/entry
17	Cytokinin dehydrogenase 7	39	CKX7_ORYSJ	Catalyzes the oxidation of cytokinins	https://www.uniprot.org/uniprotkb/Q6YW50/entry

S. Table 6: List of proteins detected from liquid (free nuclear endosperm) part of green *B. flabellifer* analyzed by LC-MS/MS using 100 mM of phosphate buffer, pH 7.6 and trypsin digested.

S.No	Protein	Score	Accession	Function	Reference
1	Beta-glucosidase 45	40	BGL45_ARATH	Hydrolyzes p-nitrophenyl beta-D-glucoside and natural glucosides such as syringin, coniferin and p-coumaryl alcohol glucoside. May be involved in lignification by hydrolyzing monolignol glucosides.	https://www.uniprot.org/uniprotkb/O80689/entry
2	IAA-amino acid hydrolase ILR1-like	40	ILL8_ORYSJ	Hydrolyzes certain amino acid conjugates of the plant growth regulator indole-3-acetic acid (IAA)	https://www.uniprot.org/uniprotkb/Q8H3C8/entry

	8				
3	ATP synthase subunit a	40	ATP6_TRITI	It may play a direct role in the translocation of protons across the membrane.	https://www.uniprot.org/uniprotkb/P68526/entry
4	Phosphatidylinositol/phosphatidylcholine transfer protein SFH2	40	SFH2_ARATH	Catalyzes the transfer of phosphatidylinositol and phosphatidylcholine between membranes in vitro	https://www.uniprot.org/uniprotkb/F4JVA9/entry
5	30S ribosomal protein S4, chloroplastic	40	RR4_ANGEV	One of the primary rRNA binding proteins, it binds directly to 16S rRNA where it nucleates assembly of the body of the 30S subunit.	https://www.uniprot.org/uniprotkb/A2T335/entry
6	CBL-interacting serine/threonine-protein kinase 23	40	CIPKN_ARATH	*Confers tolerance to low potassium conditions. *Involved in drought sensitivity and leaf transpiration.	https://www.uniprot.org/uniprotkb/Q93VD3/entry
7	Plasma membrane ATPase 1	40	PMA1_SOLLC	*The proton gradient it generates drives the active transport of nutrients by H ⁺ -symport.	https://www.uniprot.org/uniprotkb/P22180/entry
8	Structural maintenance of chromosomes protein 3	40	SMC3_ARATH	Structural maintenance of chromosomes protein 3	https://www.uniprot.org/uniprotkb?query=SMC3_ARATH
9	Exocyst complex component SEC15A	39	SC15A_ARATH	Involved in polarized cell growth and organ morphogenesis. During cytokinesis, involved in cell plate initiation, cell plate maturation and formation of new primary cell wall.	https://www.uniprot.org/uniprotkb/Q9LXX6/entry
10	ATP synthase subunit b, chloroplastic	39	ATPF_SPIOL	F1F0 ATP synthase produces ATP from ADP in the presence of a proton or sodium gradient	https://www.uniprot.org/uniprotkb/P06453/entry
11	Probable disease resistance protein At5g45510	38	DRL36_ARATH	Probable disease resistance protein	https://www.uniprot.org/uniprotkb/Q8VZC7/entry
12	Probable cytokinin riboside 5'-monophosphate phosphoribohydrolase LOGL5	38	LOGL5_ORYSJ	Phosphoribohydrolase that converts inactive cytokinin nucleotides to the biologically active free-base forms	https://www.uniprot.org/uniprotkb/Q84M85/entry
13	Transportin-1	38	TNPO1_ARATH	Functions in nuclear protein import as nuclear transport receptor.	https://www.uniprot.org/uniprotkb/Q8H0U4/entry
14	Protein trichome birefringence-like 11	38	TBL11_ARATH	May act as a bridging protein that binds pectin and other cell wall polysaccharides.	https://www.uniprot.org/uniprotkb/Q5BPJ0/entry
15	Glycoprotein 3-alpha-L-fucosyltransferase A	38	FUT11_ARATH	Involved in cell wall synthesis	https://www.uniprot.org/uniprotkb/Q9LJK1/entry

S. Table 7: List of identified mineral oxides from lyophilized and powdered tender fruit endosperm of *B. flabellifer* by X- ray diffraction (Scan range- 5° to 90°)

Name of the sample	2θ values (in degrees) for the major peaks	Match found in reference database	Crystallography Open Database- Entry no.
Black variety	25.27, 25.61, 25.74, 26.17, 26.28, 26.70, 27.18, 27.44, 27.58, 27.44, 27.58, 27.76, 27.97, 28.08, 28.32, 28.64, 28.86, 30.16, 30.35, 30.61, 32.07	Lead oxide bromide/chloride ($\text{Br}_{1.25} \text{ClO}_{2.75} \text{Pb}_{3.88}$) Calcium zirconium tantalum oxide ($\text{Ca}_7 \text{O}_{36} \text{Ta}_6 \text{Zr}_7$) $\text{O}_{118} \text{Sc}_{12.14} \text{Zr}_{49.86}$ $\text{Cs}_{48} \text{O}_{21} \text{Sn}_{20}$ Bismuth strontium copper oxide ($\text{Bi}_4 \text{Cu}_5 \text{O}_{20.5} \text{Sr}_8$) Arsenopolybasite ($\text{Ag}_{29.786} \text{As}_{3.762} \text{Cu}_{2.214} \text{S}_{22} \text{Sb}_{0.238}$)	Entry no.: 96-433-2260 Entry no.: 96-200-3174 Entry no.: 96-153-2825 Entry no.: 96-153-7111 Entry no.: 96-100-6013 Entry no.: 96-901-0622
Green variety	24.48, 24.96, 25.36, 26.46, 27.03, 27.97, 28.79, 29.24, 29.70, 30.21, 30.44, 30.80, 31.03, 31.34, 31.66, 31.92, 32.52	Vurroite ($\text{As}_{4.71} \text{Bi}_{6.97} \text{Cl}_3 \text{Pb}_{9.6} \text{S}_{27} \text{Sn}_{0.72}$) $\text{B}_{10} \text{Cu}_{15} \text{O}_{30}$ $\text{Cs}_{48} \text{O}_{21} \text{Sn}_{20}$ $\text{Bi}_{46} \text{O}_{89} \text{V}_8$ Barium fluoroniobate ($\text{Ba}_4 \text{F}_{12} \text{Nb}_2 \text{O}_3$) $\text{Ce}_2 \text{FeO}_2 \text{Se}_2$	Entry no.: 96-901-0439 Entry no.: 96-210-5419 Entry no.: 96-153-7111 Entry no.: 96-153-6257 Entry no.: 96-100-0325 Entry no.: 96-710-5871