**Supplementary table.** Protease involvement in PCD in plants. Adapted from (Balakireva and Zamyatnin, 2018; Buono et al., 2019; Zamyatnin  Jr., 2015).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Plant species | Plant protease | Family | Identified substrates | Function/Phenotype | Ref. |
| *Arabidopsis thaliana* L. | AtMC1, AtMC2 | Cys, C14B | ND | Suppression of hypersensitive cell death response upon infection with avirulent pathogen, AtMC1 and AtMC2 antagonistically control lsd1 runaway cell death | (Coll et al., 2010) |
| AtMC9 | Cys, C14B | GRI protein, PEPCK1, AtSerpin1 | Effector of PCD activation, Xylem cell death, degradation of vessel cell contents after vacuolar rupture | (Bollhoner et al., 2013, 2018) |
| CathB | Cys, C1A | ND | Required for the HR and disease resistance induced by non-host bacterial pathogens, positive regulatory role in senescence | (Gilroy et al., 2007; McLellan et al., 2009) |
| RD21 | Cys, C1A | ND | ‘Pro-death’ signal activated during elicitation of cell death, targeted by plant AtSerpin1, AtWSCP; processed by PttMC13 and PttMC14 | (Gu et al., 2012; Shindo et al., 2012) |
| RD19A | Cys, C1A | ND | RRS1-R-mediated resistance, inhibited by effector PopP2 | (Bernoux et al., 2008) |
| VPEs | Cys, C13 | Storage proteins (12S globulins and 2S albumins) | Activate vacuolar enzymes and disintegrate the vacuolar membrane to release hydrolytic enzymes during PCD, involved in the HR elicited by infection with TMV | (Hatsugai et al., 2004, 2015) |
| AtCEP1 | Cys, C1A | ND | Restriction of powdery mildew controlling late stages of compatible interaction including late epidermal PCD | (Howing et al., 2014) |
| PBA1 | Thr, T1B | ND | Caspase-3-like (DEVDase) activity in the vacuolar and plasma membranes proteasome-regulating membrane fusion | (Hatsugai et al., 2009) |
| AtSBT5.2(a and b) | Ser, S8 | ND | Independent from protease activity attenuation of MYB30-mediated HR | (Serrano et al., 2016) |
| SAG12 | Cys, C1A | ND | Its expression is induced during senescence and pathogen-induced cell death | (Singh et al., 2013)s |
| XCP1, XCP2 | Cys, C1A | ND | Post-mortem clearance | (Avci et al., 2008) |
| At2-MMP | Metallo, M10 | ND | Involvement in late flowering and early senescence | (Golldack et al., 2002) |
| FtSH4 | Metallo, M10 | ND | Involved in leaf senescence via regulation of WRKY-dependent salicylic acid accumulation and signaling | (Zhang et al., 2017) |
| AtCP51 | Cys, C1A | ND | CP51 critically mediates tapetum stability and pollen exine formation | (Yang et al., 2014) |
| *Picea abies* H. Karst. | mcII-Pa | Cys, C14 | Tudor Staphylococcal Nuclease (TSN) | Induces autophagy, which triggers RCD mechanisms during the terminal differentiation of embryonic suspensor cells, and participates in further development of RCD | (Bozhkov et al., 2005) |
| *Solanum lycopersicum* L*.* | P69B | Ser, S8 | ND | Local apoplast surveillance, substrate of Sl2-, Sl3-MMP, positive regulator of PCD | (Tian et al., 2005; Zimmermann et al., 2016) |
| P69C | Ser, S8 | Leucine-rich repeat protein | Leucine-rich repeat protein processing | (Tornero et al., 1996) |
| Sl2-, Sl3-MMPs | Metallo, M10A | P69B | Extracellular cascade of epidermal cell death | (Zimmermann et al., 2016) |
| CYP1 | Cys, C1A | ND | Involved in HR reactions | (Bar-Ziv et al., 2015) |
| C14 | Cys, C1A | ND | Defense-related secretion in haustoriated plant cells | (Bozkurt et al., 2011) |
| Sl-SBT3 | Ser, S8 | ND | Caspase-3-like DEVDase activity, HR-like PCD induction | (Cedzich et al., 2009)s |
| *Populus tremula x tremuloides* | PttMC13, PttMC14 | Cys, C14B | RD21, TSN, PASPA3 | Type II metacaspases, AtMC9 homologues, involvement of stress granules in the metacaspase-TSN pathway and xylem vessel and fiber cells PCD, processing of RD21, TSN, PASPA3—postmortem autolytic processes | (Bollhoner et al., 2018) |
| *Solanum tuberosum L.* | StSBTc-3 | Ser, S8 | ND | Caspase-3-like DEVDase activity, HR-like PCD induction | (Cedzich et al., 2009) |
| *Avena sativa* L. | Saspase | Ser, S8 | RuBisCO | RuBisCO proteolysis in victorin-induced PCD, IETDase and LEHDase activities | (Coffeen and Wolpert, 2004) |
| *Oryza sativa* L*.* | OsAP25, OsAP37 | Asp, A1 | ND | Promotion of tapetal cell death | (Niu et al., 2013) |
| UNDEAD | Asp, A1 | ND | Tapetal programmed cell death | (Phan et al., 2011) |
| *Nicotiana tabacum* L. | Phytaspase | Ser, S8 | VirD2 from *Agrobacterium tumefasciens* | Activated in tobacco mosaic virus (TMV)-induced HR, VirD2 cleavage preventing protein transport to nucleus, VEIDase, IETDase, LEHDase, and VDVADase | (Chichkova et al., 2004) |

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