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Crystal Structure of Osmotin, a Plant Antifungal Protein

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In response to fungal invasion and other signals, plants accumulate a number of proteins that are involved in defense against pathogens. Osmotin is a 24 kDa protein belonging to the pathogenesis-related (PR) protein, a component of the hypersensitive response in leaves of tobacco plants exposed to tobacco mosaic virus. Osmotin and other osmotin-like proteins were shown to have antifungal activity *in vitro* against a broad range of fungi, including several plant pathogens. To understand the structural basis of antifungal activity of osmotin we have determined the crystal structure of tobacco osmotin at 2.3 Å resolution and compared its structure with other antifungal proteins. Osmotin is composed of three domains and shows similar fold with other homologous proteins such as thaumatin, zeamation and PR-5D protein. Osmotin contains the acidic cleft found in other osmotin-like proteins except thaumatin, which does not have the antifungal activity, suggesting that this cleft is essential for antifungal activity. Structural differences found in the loop regions might be related to the binding specificity to pathogens.