Arundo donax lectin

Massimiliano Perduca[a] Michele Bovi[a] Laura Destefanis,[a] Divina Nadali[a] Laura Fin,[a] Maria Elena Carrizo[b] Hugo L. Monaco[a]

[a]*Dipartimento di Biotecnologie, Università degli Studi di Verona, Verona, Italy*
[b] *Departamento de Química Biológica, Facultad de Ciencias Químicas, Universidad Nacional de Córdoba, Córdoba, Argentina. hugolmonaco@gmail.com*

Arundo donax Lectin (ADL) is a 170 amino acid lectin that can be purified from the rhizomes of the giant reed or giant cane exploiting its selective binding to chitin followed by elution with N-acetyl glucosamine. The giant reed or giant cane (*Arundo donax*) is a massive perennial grass native to the Mediterranean basin but very widely diffused, to such an extent, that it is considered invasive and its impact on the environment can have very damaging effects on native species and has led to various efforts to reduce its population The lectin is listed in the UniProt server, the largest protein sequence database, as an uncharacterized protein with chitin-binding domains (A0A0A9P802).
We will describe the purification, three-dimensional structure and ligand-binding properties of ADL. The lectin is a homodimer in which the two protomers are linked by two disulphide bridges. Each protomer presents four carbohydrate-binding modules that belong to family 18 (CBM18). A high degree of sequence similarity is observed among the four carbohydrate binding modules present in each protomer.
We have determined the X-ray structure of the apo-protein to a resolution of 1.70 Å. The carbohydrate-binding modules, that span a sequence of approximately 40 amino acids, present four internal disulfide bridges a very short antiparallel central beta sheet and three short alpha helices, two on one side of the beta sheet and one on the other.
The structures of the complexes of the lectin with N-acetyl-glucosamine, N-acetyl-lactosamine, sialic acid and N-N' diacetyl-chitobiose reveal that ADL has two primary and two secondary carbohydrate-binding sites per dimer. They are located at the interface between the two protomers and involve in all the sites residues from both chains.
The lectin exhibits in vitro antiproliferative effects against human cancer cell lines and presents structural similarity to the wheat germ agglutinin (WGA) family, in particular to isoform 3.

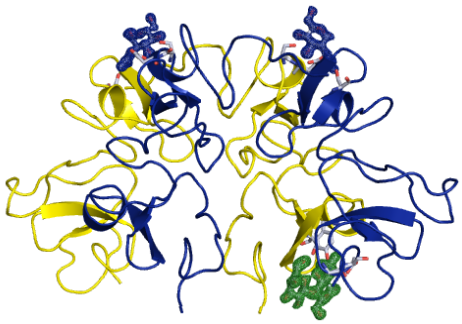

Figure 1. Arundo donax lectin with the electron density of N-Acetyl-lactosamine bound at the ✔ and 🚲 primary sites (blue, top) and the ■ site (green,bottom).

[1] M. Perduca, M. Bovi, L. Destefanis, D. Nadali, L. Fin, M.E.. Carrizo, H. L. Monaco **2019**, *to be published*.