Heat causes oligomeric rearrangements and increases the chaperone activity of a small heat shock protein from sugarcane.

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The small heat shock protein (sHsp) constitutes an important chaperone family which is linked to conformational diseases and appears to have therapeutic properties. In plants, sHsps prevent protein aggregation by acting as thermosensors and therefore enhancing cell stress tolerance. SsHsp17.2 is one of the most expressed class I sHsps in sugarcane and are dodecamers at 20ºC. Here, we investigated the effects of heat on the oligomerization and on the chaperone activity of these proteins. By using several biophysical and biochemical probes, we showed that the effects of heat were reversible, an important property for proteins that act as thermosensors. SsHsp17.2 dodecamer dissociated at heat shock temperatures, from 40-45ºC, and this dissociation was followed by enhanced chaperone activity. The enhanced activity was maintained at temperatures 5-10ºC higher than heat shock but not above that when the protein started to unfold. The oligomeric dissociation of SsHsp17.2 seemed to occur as an independent event and thermodynamic parameters were measured. We concluded that temperature affected the oligomeric state of the chaperones increasing their chaperone activity.

Abbreviations: sHsp, small heat shock protein; SsHsp17.2, 17.2 kDa Saccharum sp. (sugarcane) sHsp.

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