



## EFFECT OF POLYVINYLPIRROLIDONE (PVPP) ON PROANTHOCYANIDINS FROM VARIED PLANT SOURCES

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### ABSTRACT

In order to determine the quality of condensed tannins in some plant extracts, PVPP was reacted with the various proanthocyanidins (condensed tannins). Condensed tannins whose binding with PVPP is irreversible are desirable as anthelmintic agents because their helminth enzyme inhibitory effect cannot be reversed. The condensed tannins of the plants *P. thonningii*, *Urena lobota*, *Quebracho*, *Cassia sieberiana*, *Psidium guajava*, Tea, Tannic acid, *Acacia nilotia* (pod) were reacted with PVPP. The degree of interaction of the various plants extracts with PVPP varied, least with *Quebracho* and highest for *Cassia*.

**KEYWORDS:** Irreversible binding, quality, anthelmintic potential

### INTRODUCTION

Polyphenols to which proanthocyanidins (condensed tannins) belong vary in composition in nature (Ribereau-Gayon, 1972). This suggests that their medicinal properties may also vary from plant to plant. Experiments conducted by Fakae *et al.* (2000) and Fakae and Brophy (2001) demonstrated that the proanthocyanidins in *Piliostigma* differed significantly from those from other plants in that its helminth enzyme inhibitory effect could not be reversed by the presence of PVPP, which is usually used to purify enzyme solution (Kellam *et al.*, 1992). Its purification comes from its ability to bind polyphenols and thus allows enzymes to react normally. Although there may be other ways to characterised condense tannins, the studies of scientists in Wales point to the possibility of using precipitation by PVPP to class proanthocyanidins from suspected anthelmintic plants. A stronger and irreversible bond with enzyme that is unaffected by PVPP may be desired for extracts from forages that could be used for the control of gastrointestinal helminths of grazing animals.

Although traditionally used forages may contain condense tannins, which are potential anthelmintic principles, these have not been assessed on the basis of their affinity to PVPP. It is thus desirable to conduct the following experiments to determine the effect of PVPP on the tanniferous content of some Nigerian forages, with a view of qualifying the tannins and determining their anthelmintic potentials. There is no doubt that the information obtained will be useful in identifying forages that could be planted for sustainable helminth control in grazing animals. More so, only condense tannins have the vermifuge potential, and only particular condensed tannins such as the type found in *Piliostigma thonningii* may be superb for the function because their inhibitory effect on parasite GSTs is irreversible (Fakae *et al.*, 2000). This is because PVPP normally used for clearing unwanted polyphenolic constituents from the condense tannin extract (Kellam *et al.*, 1992) do not bind it (while it binds others)

thereby availing it for the highly desired tannin-protein complex formation and it is this binding effect that distinguishes it from polyphenols

### MATERIALS AND METHODS

#### Medicinal plants

Plant materials used for the study were candidate plants which have been proven to contain a reasonable amount of condensed tannins. These include *P. thonningii*, *Urena lobota*, *Quebracho*, *Cassia sieberiana*, *Psidium guajava*, Tea, Tannic acid, *Acacia nilotia* (pod).

10mg of pulverised air-dried materials were extracted exhaustively with 1ml of 50% methanol overnight. The extract was then strained through a fine sieve and centrifuged at 36000g for 20 minutes.

#### Reaction with PVPP

40mg of PVPP was added to 1ml of each plant extract and vortexed for 5 minutes on Vortex Mixer. The resultant mixture was reacted for further 10 minutes with shaking at intervals. Another 1ml of the same plant was used as control, as no PVPP was added. 50ml of each solution (with or without PVPP) was then used for estimation of free (unbound) condense tannins by the HCl-butanol Method. The absorbances of the solutions were read at 550nm of the spectrophotometer (PERKIN-ELMER-US COLEMAN INSTRUMENTS). PVPP binding was determined by subtracting optical density of solution without PVPP from that with PVPP.

### RESULTS

Results were expressed as a percentage of the control solution. Levels of interaction with PVPP by the various plant extracts investigated are as shown in Fig 1. The degree of interaction of the various plants extracts with PVPP varied, least with *Quebracho* and highest for *Cassia*.

## DISCUSSION

There were variable levels of binding of extract (components) with PVPP, and *Cassia sieberiana* extract being bound the most while *Piliostigma thonningii*, *Psidium guajava* and tannic acid were not bound at all. This suggests that *Psidium* and *Piliostigma* contain condensed tannins of a particular quality. This none

responsiveness to the effect of PVPP on polyphenols in *Piliostigma* as seen agrees with the result of Fakae *et al.*, 2000 and Fakae and Brophy, (2002). Although *Psidium* contains only about 32% of the condensed tannin in *Piliostigma*, it is a candidate plant as its condensed tannin has the same activity with that of *Piliostigma*.

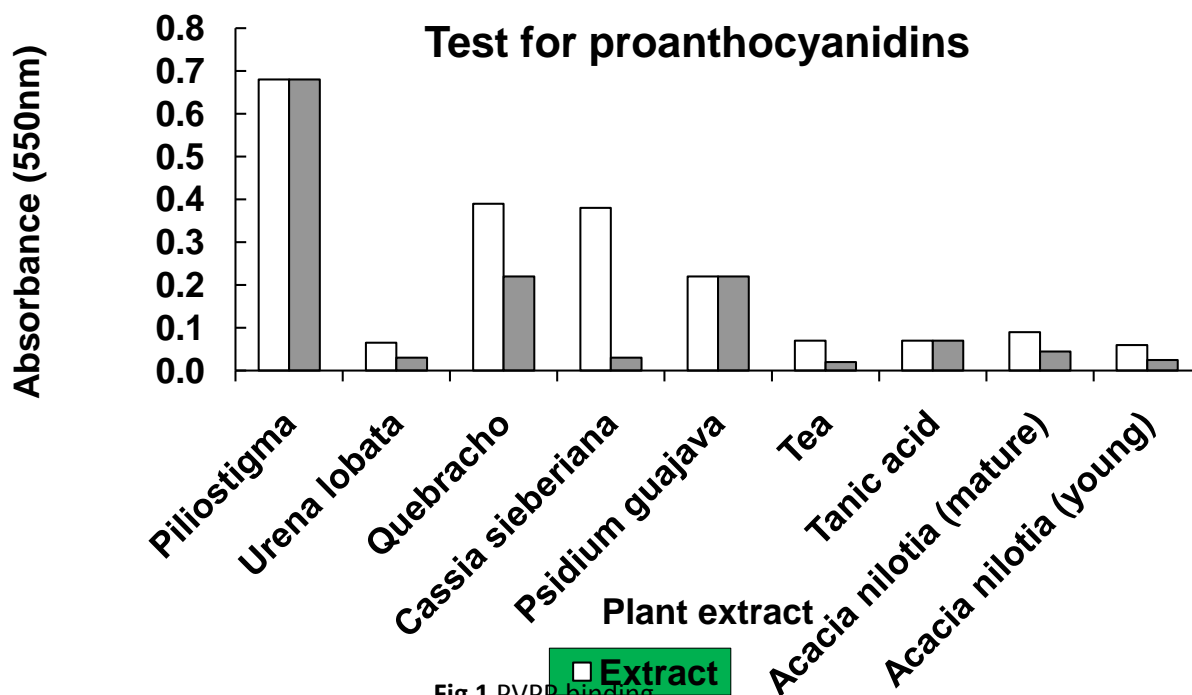


Fig 1 PVPP binding

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