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RESEARCH ARTICLE

Evaluation of Three Phytochemical Constituents of the Seed Extracts of Three Varieties of *Capsicum Annum* in Awka, Anambra State, South Eastern Nigeria in Relation to Their Medicinal Value

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ABSTRACT

The seeds of *Capsicum annum* have been widely cultivated in many regions of this country, Nigeria. This *Capsicum annum* serve as food condiment in many Nigerian soup and the seed have been the interest of the consumers.
This research was conducted to evaluate the tannins, alkaloids and flavonoids phytochemical constituents of the seeds of three varieties of *Capsicum annum* (Nsukka yellow, Atarugu and Otuocha varieties) grown in Awka, Anambra State South Eastern Nigeria. The seeds were subjected to phytochemical analysis for quantitative studies. At the end of this research, it was observed that the tannins in the seed of Atarugu variety is the highest among the three varieties studied having the mean value of 1.79. Also the alkaloids and flavonoids of Nsukka yellow variety were the highest among the three studied having the mean of 6.31 and 4.21 respectively. From the research, it can be stated that the seeds of Atarugu variety will be spicier than others. Also the seeds of Nsukka yellow variety are more medicinal among the three varieties studied.

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INTRODUCTION

The genus, *Capsicum* L. belongs to the family Solanaceae (Night shade) members and therefore closely related to their genetic cousins, the tomato, potato, tobacco and egg plant. Members of Solanaceae are mostly herbs or under shrubs while some others are climbers (Singh, 2004). The family contains about 90 genera and nearly 3000 species (Stern, 2000, Vidyyartie and Tripatha 2002).

Capsicum consists approximately of 20-27 species, (Walsh *et al*., 2001) five of which are domesticated which include the *Capsicum annum*, *Capsicum baccatum*, *Capsicum chinense*, *Capsicum frutescens* and *Capsicum pubescens* . (Heiser *et al*., 1969). *Capsicum* species can be eaten raw or cooked. Those used in cooking are generally varieties of *Capsicum annum* and *Capsicum frutescens* species. In Nigeria, *Capsicum* species are rated third in importance among the cultivated vegetables (Uzo, 1982). They are widely cultivated because of their spicy nature, vegetable, medicine and nutritional value. (Sharma, 1993). Plants extract are known to contain phytochemical compounds which have medicinal effects accumulated by plants organic substances (Harborne 1973).

Adesokan *et al*., (2008) reported that the medicinal properties of plants could be based on the antioxidant, antimicrobial and antipyretic effects of the phytochemicals in them. These constituents are chemical compounds formed during the plants normal metabolic processess often referred to as "secondary metabolites", of which there are several classes including alkaloids, flavonoids, tannins etc. (Harborne, 1973; Okwu, 2004). Most of these phytochemical constituents are potent bioactive compounds found in plant parts which are precursors, for the synthesis of useful drugs (Sofowora, 1993).

Tannin is a general descriptive name for a group of polymeric substances capable of tanning leather or precipitate gelatin from a solution, a property known as astringency (Harborne, 1973).The astringency from this is what causes the dry and puckery feeling in the mouth (Schiavone *et al*., 2007). Tannin if ingested in excessive quantities inhibits the absorption of minerals such as iron which may, if prolonged, lead to anaemia (Chavan *et al*., 1995). Many physiological activities such as stimulation

of phagocytic cells, host medicated tumor activity and wide range of anti-infective action have been assigned to tannins (Okwu and Okwu, 2004).

Alkaloids rank among the most efficient and therapeutically significant plant substances (Okwu, 2005). Alkaloid production is a characteristic of all plant organs. They exhibit marked physiological activity when administered to animals (Okwu and Okwu, 2004). Furthermore, alkaloids are often toxic to man and many have dramatic physiological activities, hence their wide use in medicine for the development of drugs. (Harbone, 1973; Okwu, 2005; Okigbo *et al.,* 2009).

Flavonoids are generally distributed throughout the plant kingdom (Okigbo *et al.,* 2009). They are particular in human diet as they act as free radical scavengers, antioxidants, diuretic, antiviral, antibacterial, antimicrobial, anti-inflammatory, anti-tumour and anti-platelets agents (Hertog *et, al*., 1999). They are synthesized by plants in response to microbial infection and have been found in vitro to be effective against a wide array of micro-organisms (Harborne, 1973). They show anti-allergic, anti-inflammatory (Chavan *et al.,* 1995), anti-microbial (Hamilton-Miller, 1995) and anti-cancer activities. In terms of anti-cancer activity, they inhibit the initiation, promotion and progression of tumors (Urquiaga and Leighton, 2000; Okwu, 2004). In recent times, plant flavonoids have attracted attention as potentially important dietary factor in cancer as chemo-protective agents (Hertog *et al.,* 1993; Elangevan *et al.,* 1994). This research was designed to evaluate the phytochemical constituents (tannin, alkaloids and flavonoid) of three varieties of *Capsicum annum* seeds.

MATERIALS AND METHODS

Sources of materials

The matured fruit of *Capsicum* annum; Nsukka yellow, Atarugu and Otuocha were collected from the experimental garden at Nnamdi Azikiwe University Awka. The fruits of each of the variety were authenticated at the Department of Botany Nnamdi Azikiwe University Awka by a Plant Taxonomist Prof CU Okeke.

Preparation of seed extract for phytochemical analysis

The fresh plant seeds were removed with a knife and oven dried for 2 days at 70◦C. The dried seeds were matched in a mortar separately and thereafter grinded to a fine powder using corona grinding machine. The dried powdered samples were used for the analysis.

Quantitative determination of the phytochemical constituents of the plants studied

Determination was done using the alkaline precipitation gravimetric method described by Harborne (1973). The flavonoid was done using the acid alkaline test described by Harborne (1973). While the tannin was done using the ferric chloride test described by Harborne (1973). These phytochemicals were compared and the results were subjected to analysis of variance, the specific differences in constituent means were determined using Least Significant Difference (LSD), (Steel and Torrie, 1990).

RESULTS

Table 1 and figure 1 show that the tannins in Atarugu variety is the highest followed by that of Otuocha variety, while the Nsukka variety has the lowest tannins. From the result also it was observed that there were significant difference ($P<0.05$) between the alkaloids and flavonoids of Nsukka variety and that of Atarugu and Otuocha varieties. Nsukka variety has the highest mean in alkaloids and flavonoids, (6.31 and 4.21) followed by those of Otuocha variety, (4.78 and 2.64). The Atarugu variety has the lowest value of alkaloids and flavonoids (2.63 and 1.44 respectively).

Table 1: mean constituents of Alkaloids, Tannin and Flavonoids in the seeds of three varieties of *Capsicum annum*

Varieties	Tannins	Alkaloids	Flavonoids
Nsukka yellow	0.95	6.31	4.21
Atarugu	1.79	2.63	1.44
Otuocha	1.09	4.78	2.64

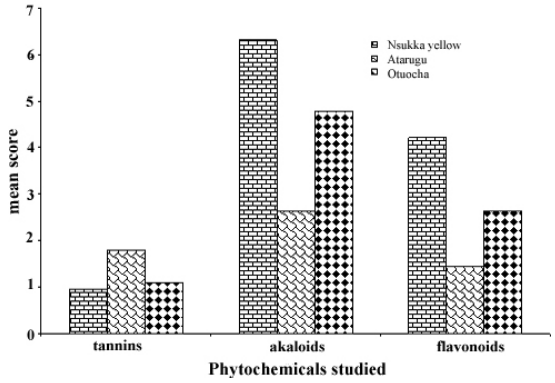

Fig. 1: Means of Phytochemicals

DISCUSSION

From the result above, it was observed that the tannins of Atarugu variety of *Capsicum annum* is the greatest among the varieties studied having the mean value of 1.79. It means that Atarugu variety will have the highest astringency. This implies that the seed of Atarugu variety will cause dry and puckery feeling in the mouth as stated by Schiavone *et al*., (2007) more than other varieties. If this variety is ingested in excessive quantities it can inhibit the absorption of minerals such as iron which may, if prolonged, lead to anaemia as Chavan *et al*., (1995) indicated. The results above also indicated that the alkaloids and the flavonoids in Nsukka variety are the highest among the other varieties studied having the mean values of 6.31 and 4.21. This means that the Nsukka variety is the most efficient and therapeutically significant plant among the three because of it alkaloid content as stated by Okwu, (2005). Nsukka variety will also show more anti-allergic, anti-inflammatory, anti-microbial and anti-cancer activities than other two varieties because of its alkaloid content as indicated by Chavan *et al.,* (1995) and Hamilton-Miller, (1995). High flavonoids of Nsukka variety makes it potentially important dietary factor in cancer as chemo-protective agents as stated by Hertog *et al.,* (1993) and Elangevan *et al.,* (1994).

Conclusion

From the result of this research, it was observed that tannins in the seed of Atarugu variety is the highest among the three varieties studied. Also the alkaloids and flavonoids in the seed of Nsukka variety were the highest. From these findings, it can be stated that the Atarugu variety is puckerier and can be spicier especially to those feeling nausea. Again, Nsukka variety, having more alkaloids and flavonoids will be more potent in the production of drugs. In other words, Nsukka variety is more medicinal.

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