



THE SOLANUM NIGRUM COMPLEX IN WESTERN KENYA

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ABSTRACT: *Solanum nigrum* complex is a group of plant species used as indigenous vegetables and also a source of traditional medicine in Kenya and other parts of the world. There are many species in the *S. nigrum* complex which include *S. villosum*, *S. scabrum*, *S. nigrum* and *S. americanum* among others. This study was carried out in order to determine the species of the *S. nigrum* complex found in Western Kenya. Samples were collected from Eldoret, Kisumu, Kakamega, and Bungoma. The plants were then pressed and sent to a taxonomist at Egerton University for classification and identification. The samples collected were found to belong to three different species namely; *S. nigrum*, *S. scabrum* and *S. villosum*; which all belong to the *S. nigrum* complex. The vegetative features exhibiting variations included colour and size of the berries, size of leaves and colour and shape of the stems. *S. scabrum* was found to be the most common in the study region and this was associated to the popularity of the species as food based on the large size of the leaves, and the taste of the leaves as cooked vegetables

Key words: *Solanum nigrum* complex, *S. nigrum*, *S. scabrum*, *S. villosum*, County.

INTRODUCTION

Solanum nigrum complex comprise of both native and bred solanum species used as vegetables and source of fruits in Kenya and other parts of the world [1]. Both indigenous (wild types) and modified (hybrid) varieties have been cultivated [2]. These plants are believed to have a high nutritional value [1]. The leaves are eaten as vegetable in most parts of the world while the ripe seeds are also edible in some cases [3]. There are a number of species in the *S. nigrum* complex which include *S. nigrum*, *S. villosum*, *S. scabrum*, *S. americana*, *S. burkankii*, and *S. schenopodioides* among others. All these species highly resemble each other closely and these pose a problem in the taxonomy of the species, therefore they are all considered to belong to the *S. nigrum* complex. Species in the *S. nigrum* complex exhibit considerable genetic variation, both florally and vegetatively. These variations occur in different populations of the same species. Sometimes the character may be genetically controlled in one variant, but phenotypically plastic in another [3]. This group of plants display a great amount of phenotypic variation, particularly in their vegetative features such as plant habits, leaf size and form, and stem winging. In addition, senescence of this plant is usually accompanied by smaller and fewer flowers and berries than usual, while the gene for anthocyanin pigmentation in flowers seems to be dependent on light intensity and temperature for its expression. It is often difficult to define the limits within which such features are genetically fixed [4]. Other than being used as vegetables, *S. nigrum* complex also forms an important part of traditional medicine in Africa. In Kenya, unripe fruits are used to soothe toothache. They are also squeezed on babies' gums to ease pain during teething. Leaves are used to treat stomach-ache and extracts from leaves and fruits are used to treat tonsillitis [3]. However, it is not clearly known how many species of the *S. nigrum* complex are available in Kenya. This study aimed at finding out the different species of the *S. nigrum* complex that are used by different communities as vegetables and medicine in the Western part of Kenya.

MATERIALS AND METHODS

Study area

Samples were collected from farmers in Eldoret (Ziwa), Bungoma (Kamukuywa), Kakamega (Butsotso and Kabras) and Kisumu (Ahero and Kano). Sample classification and identification was done at the Chemistry Department of Egerton University, Kenya. Pressed samples were stored at the herbarium of the University of Eldoret, Kenya.

Sample collection and identification

A survey was done by consulting with the farmers and the Agricultural extension officers from the ministry of Agriculture in order to determine the number of species and varieties of *S. nigrum* complex present in the region. A total of ten different populations were collected from the various regions. The plants were labelled according to the local names used by the farmers in the field pending identification. The samples were pressed and taken to a taxonomist at Egerton University for identification. The specific names of the plants were identified for the different plant populations collected. Photos of the plants, the berries and the seeds were also taken to assist in the classification. Pressed samples of the plants are stored at the herbarium at the University of Eldoret under reference number SN23/12.

RESULTS AND DISCUSSION

Species of *S. nigrum* complex in Western Kenya

The samples were found to belong to three different species namely *S. nigrum*, *S. villosum* and *S. scabrum*. The *S. villosum* species is characterised by the colour of ripe berries ranging from yellow through orange to red while those of *S. nigrum* Mill vary from green through purple to black [3]. The most common species was found to be *S. scabrum*. This is the modified variety whose seeds are easily available in the agrovet shops in Kenya. The leaves are very wide making the species very popular among traders. The relatively less bitter taste of the leaves also contribute to its popularity as a vegetable. *S. nigrum* was found to be the second most common. This is the indigenous bitter variety and is highly preferred in Bungoma County by the Bukusu tribe due to its characteristic bitter taste which is enjoyed by people who also believe that the bitter taste is proportional to the level of traditional medicine present in the vegetable. *S. villosum* is very popular in Eldoret County among the Kalenjin people. It has no bitter taste and is considered as a traditional vegetable. The ripe berries are also edible.

S. nigrum complex morphological characteristics

S. scabrum is the modified variety with the seeds supplied by the Kenya seed company (Figure 1). The berries were wide (up to 20 mm diameter); they were black in colour when ripe and were not edible. The leaves were more rounded and wide with smooth edges. The stems and petiole were also wide and highly succulent. The flowers in most instances were white. *S. nigrum* Mill. was found to be one of the indigenous species of the *S. nigrum* complex from Kenya (Figure 2). The local name was associated with the characteristic bitter taste of the leaves after cooking. The leaves were more elongated with longer leaf tip as compared to *S. scabrum*. The main distinguishing feature of this species was the colour and size of the berries. The ripe berries of the *S. nigrum* Mill. were black in colour, just like the modified variety (*S. scabrum*), but small in size (approximately 5mm in diameter) and not edible. Figure 3 shows the *S. villosum* species. This species was characterized by the relatively less bitter taste of the leaves when used as vegetables. The leaves were far slender with serrated edges (Figure 3). The main distinguishing characteristic is the colour of the berries. The berries were green when unripe and then they turned orange when ripe. These berries were sweet and edible when ripe. They had a diameter of approximately 5mm.



Figure 1: *S. Scabrum*



Figure 2: *S. Nigrum*



Figure 3: *S. Villosum*

From the study, two species were collected from Kisumu county. One was *S. scabrum* (Kisumu Agriculture) which is a cultivated variety and the seeds are bought from the modern agrovets, being supplied by the Kenya seed company. This variety is the modified type and not indigenous, thus its locally referred to as the agriculture variety because the seeds were introduced to the local people by the Agricultural extension officers. The other species was *S. nigrum* Mill. According to the farmers, these leaves are bitter and milk is added in the leaves during cooking in order to reduce the bitterness. Species collected from Kakamega were also two. *S. scabrum* was the most common and most popular in this region according to the farmers. It is highly commercialised and marketable. The other species was *S. nigrum* Mill. which is an indigenous variety. It is less popular and only available as a weed because of its bitter taste as a vegetable. It grows during the rainy season and is rarely cultivated in this region. Species collected from Eldoret were *S. scabrum* and *S. villosum*. *S. villosum* is also cultivated just like *S. scabrum* in the Eldoret region and is equally highly marketable. Table 1 shows the distribution of the species in Western Kenya. Bungoma county had all the three species available in the farms. Interestingly, the local people here preferred *S. nigrum* Mill. as a vegetable.

Table 1: Geographical distribution of the species in Western Kenya

	Kisumu	Kakamega	Bungoma	Eldoret
S. Nigrum Mill	+	+	+	-
S. Villosum	-	-	+	+
S. Scabrum	+	+	+	+

Key: (+) – present, (-) - absent

S. scabrum was found to be common in all the four counties while *S. nigrum* Mill. was present in three counties. Species *S. villosum* was found only in Eldoret and Bungoma counties. *Solanum villosum* Mill. Sub sp. *miniatum* (Bernh. ex Willd.) Edmonds is among the widely consumed African nightshade species in Kenya and many parts of sub-Saharan Africa [5]; [6]. The readily available genotype of *S. villosum* in Kenya is largely wild-type that bears small leaves and has high incidence of flowering and fruiting [7].

CONCLUSION AND RECOMMENDATION

The study reveals that there are three different species of the *S. nigrum* complex growing in Western Kenya. It also revealed that different counties cultivate different species of the *S. nigrum* complex depending on the need and taste of the particular species after cooking. In some counties certain species are more preferred than others. According to the study, different communities choose a species as a vegetable depending on their tradition, availability and taste. It is recommended that similar work is done throughout Kenya in order to know the distribution of the *Solanum nigrum* complex in Kenya which will be of necessity during improvement of the vegetable species that are preferred by the communities.

ACKNOWLEDGEMENT

The author is grateful to the National Commission for Science, Technology and Innovation for funding the research work. The author is thankful to the county agricultural extension officers for the information provided on the *S. nigrum* complex farming. The author is also thankful to the farmers in the area where the study was carried out for their co operation.

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