



# Comparative Study of Three Cowpea Variety Against Different Soil Samples

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**Abstract:** The effect of soil type and rate of germination on cowpea varieties (*Vigna unguiculata*) were studied. Three cowpea varieties viz, A (IT90K – 277 – 2), B (IT93K – 452 – 35) C (IT97L – 499 – 1) are planted under different soil types (sand, clay and loamy) and length of each plant with its corresponding number of leaves are recorded. The result of the experiment revealed that cowpea plant variety A (IT90K – 277 – 2) will be best suited for planting in sandy soil and the least recommendation for planting this variety is clay soil. For cowpea variety B (IT93K – 452 – 35) the best suited soil for planting is loamy soil and the least been planting it under sandy soil for variety C (IT97K – 499 – 1) the best soil growing this kind of variety is in clay soil and the least recommendation is planting on sandy soil.

**Keywords:** Cowpea, *Vigna Unguiculata*, Sandy, Loamy, Clay

## 1. Introduction

Cowpea is a summer annual legume with trifoliolate leaves. There are many cultivars, bred for diverse ecological niches, and they vary greatly in growth habit. Some are short, upright bush types, and others are tall and vine-like. Cowpea grows rapidly, reaching a height of 19–24 inches (48–61 cm) when grown under favourable conditions [1-2]. Most root growth usually occurs within the topsoil layer, but in times of drought cowpea can grow a taproot as long as 8 ft to reach moisture deeper in the soil profile [1, 3]. Cowpea can be grown and harvested within 60-80 days [4]. Cowpea (*Vigna* (L.) is an important grain legume in the dry savannah of the tropics covering 12.5 million hectares with annual production of about 3 million tons [1]. Nigeria is one of the world's largest producer of cowpea with an average production of 2.92 million tons followed by Niger with 1.10 million tons [1, 5]. Cowpea (*V. unguiculata* (L) Walp) is a major staple food crop in sub-Saharan Africa, especially in the dry

savannah regions of West Africa. The seeds are a major source of plant proteins and vitamins for man, feed for animals, and also a source of cash income [1, 6]. The young leaves and immature pods are eaten as vegetables. There is a big market for the sale of cowpea grain and fodder in West Africa. In Nigeria, farmers who cut and store cowpea fodder for sale at the peak of the dry season have been found to increase their annual income by 25% [1, 7]. Compared to cereals, its grains yield is low, probably due to the construction cost of the major nutrient component which is predominantly protein [8].

Cowpea also plays an important role in providing soil nitrogen to cereal crops (such as maize, millet, and sorghum) when grown in rotation, especially in areas where poor soil fertility is a problem. It does not require a high rate of nitrogen fertilization; its roots have nodules in which soil bacteria called Rhizobia inhabit and help to fix nitrogen from the air into the soil in the form of nitrates [1, 9]. There are good reasons for the economic importance of cowpea; one of them being the excellent nutrition it offers. At different places and times in

Africa the grain, the green pods, the dried leaves, and hay all command good market prices. One factor driving demand is the high-quality protein it offers. On average, the grain contains about 23–25% protein by weight. Dried cowpea foliage is likewise protein rich, offering on a dry weight basis levels similar to the grain [10]. According to [11-12] cowpea is rich in protein, minerals and vitamins and constitutes an excellent supplement to cereals and tubers widely used as staple foods in sub-Saharan Africa. In addition, cowpea is adapted to different ecological zones and plays an important role in soil fertility through symbiotic nitrogen fixation and can be a food of choice for livestock due to the quality of its foliage [11]. The aim of the research is to determine the rate of germination on three different cowpea samples in respect to soil type. To determine whether the soil affect the rate of germination. To examine the type of soil which that is best suitable for cultivation of cowpea. To examine the best cowpea sample among the three sample used.

**Table 1.** Scientific classification of cowpea.

S/no		
1	Kingdom	Plantae
2	Phylum	Tracheophyta
3	Class	Magnoliopsida
4	Order	Fabales
5	Family	Fabaceae
6	Genus	Vigna
7	Specie	unguiculata

[13].

**Table 2.** Nutrient Content of Matured Cowpea.

1	Protein	24.8%
2	Fat	1.9%
3	Fiber	6.3%
4	Carbohydrate	63.6%
5	Thiamine	0.0004%
6	Riboflavin	0.00042%
7	Niacin	0.00281%

## 2. Materials and Method

### 2.1. Sample Collection

The samples was collected from international institute of tropical agriculture Kano (IITA) it was lebeled and stored according to sample varieties.

### 2.2. Planting Materials Used

Cowpea varieties  
 Manure (animal dunk)  
 Plastic bowl (12)  
 Masking tape  
 Soil types

### 2.3. Preparation of Soil Sample

Three types of soil (sandy, clay, loamy) were used, About 200g of each soil sample was measured and mixed together with 50g of animals dunk, using hand shovel sample was

mixed properly until the dunk and soil were collectively mixed together, Same procedure was applied for clay and loamy.

### 2.4. Planting of Seed Samples

At the initial stage, the plastic bowl was labeled based on varieties of cowpea number and a hole was made in each bowl.

They were divided into four (4) groups, each groups representing each soil sample, sandy, loamy, and clay and the remaining three serve as control. In each of the soil sample the three (3) cowpea variety was planted, All the three (3) plastic bowl were labeled based on the variety (IT 90k – 277 – 2, IT 93k – 452 – 35, IT97 – 499 – 1) same procedure were applied for all other soil samples and control.

## 3. Result

From the in table 1 below in cowpea variety A sandy soil recorded the highest length of seedling which is 22.22mm followed by loamy which is 22.97mm and the least was recorded on clay soil. For the second variety which is variety B loamy soil has the highest length of 20.03mm followed by clay soil with 17.34mm then the least was recorded on sandy soil. In the last variety clay soil has the highest length of 22.05mm then loamy soil with 15.45mm least was recorded in sandy soil 14.48mm.

**Table 3.** Length of Cowpea variety under three different soil type.

Soil type	A (mm)	B (mm)	C (MM)
SANDY	24.22	15.90	14.86
CLAY	20.13	17.34	22.05
LOAMY	22.97	20.03	15.45

Key (A) IT90K – 277 – 2 (B) IT93K – 452 – 35 (C) IT97K – 499 – 1.

Table 2 below shows the number of leaves of cowpea variety against the soil type used it was found that for variety A loamy soil have the highest number of leaves which is 7, the clay and sandy have equal number of leaves (6). In the second variety across all soil type they have the same number of leave which is 4. Furthermore variation occur in variety C with clay soil having the highest number of leaves that 6 followed by loamy soil with 2 and sandy soil having only 1 leave.

**Table 4.** Number of leaves of cowpea variety under three different soil sample.

Soil type	A	B	C
Sandy soil	6	4	1
Clay soil	6	4	6
Loamy soil	7	4	2

Key (A) IT90K – 277 – 2 (B) IT93K – 452 – 35 (C) IT97K – 499 – 1.

## 4. Discussion

The cowpea is an annual herbaceous legume from the genus *vigna*. Due to its tolerance for sandy soil and low

rainfall it is an important crop in the semi – arid regions across Africa and the countries [14]. It requires very few input as the plant root are able to fix atmospheric nitrogen making it valuable. Crop for resources poor farmers and well suited to intercropping with other crops. The cowpea (*vigna unguiculata*) are edible seeds or for fodder it may be climbing and erect as well as prostrate and creeping depending on the cultivar [15] prostrate varieties grow to about 80 cm and climbing cultivars up 2 m it has well developed root tube 6 – 15 cm long 4 – 11 cm broad the papilionaceous flower can be white yellowish blue or violet and are distributed and auxiliary cluster pods occurs in pairs forming a mostly pendulous but they can be erect cylindrical 6 to 20 cm long and 3 0 12 inches broad contain about 8 – 20 seeds it may be white pink, brown or black [16]. Cowpea seed provide a rich sources of protein and calories as well as minerals and vitamins. This complement the mainly cereal diet in countries that grow cowpea as a major crop. A seed can consist of protein and has very low food content, cowpea starch from cereal which is more beneficial to human health as a warm season crop that cannot stand cold weather warm and moist climate is favorable heavy rainfall, cowpea thrive in poor condition growing well soil up to 85% sand. The optimum temperature of cowpea grow in 30% (making of only available as summer crop. The ideal soil are sandy and it has better tolerance for fertile and acid soil than more other crops [17]. Cowpea can be grow in all types of soil but sandy and loamy are best suited for its cowpea are good sources of protein, vitamin A, the amine, riboflavin, iron sources phosphorus, potassium and a very good sources of vitamins c, magnesium and manganese.

Planting cowpea seeds variety A (ITK90K – 277 – 2) on different soil sample (sandy, loamy, clay) and under same treatment condition, sandy soil recorded the highest number of leaves (7) and highest length of plant (24.23 mm) followed by loamy and then clay and for variety B (IT93K – 452 – 35) on different soil type same treatment condition all plant recorded to have 14, number of leaves but loamy soil has higher in lengths (20.03 mm) than the other and for variety C (IT97K – 499 – 1) clay soil recorded the highest number of leaves (6) and highest in length (22.05 mm) followed by loamy and then sandy soil.

## 5. Conclusion

The difference recorded in the variables (length of plants and their respective number of leaves) of cowpea varieties A (IT90K – 277 – 2), B (IT93 – 452 – 35) C (IT97K – 499 – 1) planted under different soil types has significant effect on the rate of germination of cowpea varieties. Knowledge of this is of paramount importance to know which kind of cowpea variety will be best suited for planting on different soil types in consideration of tested parameters of vigorous growth which are length of the plant and the corresponding number of leaves. It should be noted that the more the number of leaves the more the advancement of photosynthesis.

## 6. Recommendation

Based on this finding of this research, the following recommendations was made.

Cowpea plant variety A (IT90K – 277 – 2) will be best suited for planting in sandy soil. This is because, the differences in the number of leaves and length was very negligible on clay soil exceeding with only one number of leaf (Table 2). In this case, the most important parameter to consider is the length of the plant in which the highest length was recorded in sandy soil (Table 1) the length of the plant will help the plant to overcome competition for sunlight and the number of leaves which is six (Table 2) are enough for effective photosynthesis in consideration of same factors above the next recommended soil type for planting cowpea variety A was loamy soil and least recommended was clay soil. For cowpea variety B (IT93 – 452 – 35) with equal number of leaves recorded was four (Table 2) the parameter considered was the length of each respective plants. This type of cowpea variety will be best suited for planting under loamy soil with highest height of 20.03 mm followed by clay soil which recorded length of 17.34 mm and the least recommended variety was sandy soil having length of 15.90 mm (Table 1) as earlier on mentioned. For cowpea variety C (IT97K – 499 – 1) in consideration of number of leaves recorded for plant growing under clay – soil. Clay soil was the best recommended followed by loamy soil and least was sandy soil with 14.86 mm length and only one number of leaf (Table 1 and Table 2).

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