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Qualitative screening of selected *Allium* species of Gujarat using different extracts

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Abstract
A plant is a major source of phytochemicals. There are so many phytochemicals present in the plant which work as bioactive compounds and help to cure diseases. The present study represents the qualitative analysis of the major bioactive compounds of medicinally useful plants *Allium cepa* L. (Onion) and *Allium sativum* L. (Garlic) in its different extracts of bulb from selected districts of Gujarat Chloroform was selected as non-polar solvent, acetone as polar protic and methanol and distilled water as polar protic solvent. The qualitative screening tests were conducted by using standard protocol. The qualitative screening tests showed the presence of alkaloids, carbohydrates, glycosides, saponins, phytosterols, phenols, tannins, flavonoids, diterpenes, proteins and amino acids except cardiac glycosides. The presence of these phytochemicals indicates the pharmacological activity of different extracts of these plants.

Keywords: Qualitative screening, Allium, Bioactive compound, Extracts

1. Introduction
Phytochemicals are known as non-nutritive plant chemicals. They have protective or disease preventive properties. It is very common that they are non-essential nutrients. Thus they are not necessary for human body. We know that plant is a source of phytochemicals which are produced by them to protect themselves. In recent research it is established that they have ability to protect human body against various diseases [1]. This is possible only in the presence of various phytochemicals. An onion (*Allium cepa* L.) is a plant of Liliaceae family. In all the largest grown crops it is the one. Central Asia is known as the origin of an onion [2]. It is known to play key role in reducing the risk of cardiovascular diseases, an anticancerous and also works as an antioxidant. Quercetin is a phytochemical which is present in large amount in onion. In addition to that there are so many phytochemicals which are present in onion like phenols, flavonoids and sulfur containing compounds etc. [3]. Garlic (*Allium sativum* L.) is also belongs to the Liliaceae family. Its origin is Asia. But now China, North Africa (Egypt), Europe and Mexico are also known for cultivation of garlic. It is known that this whole plant and its various parts are used as medicines, spice and food additives too. There are so many activities in which garlic plays an important part like antimicrobial, cardiovascular, anti-inflammatory and anticancer activities [4].

2. Material and Methods
2.1. Sample Selection
I. Onion
Classification (According to Bentham and Hooker's Classification System)
Kingdom: Plant
Division: Phanerogamia
Class: Monocotyledon
Series: Coronarieae
Family: Liliaceae
Genus: Allium
Species: cepa
Scientific Name: - *Allium cepa* L. (from Latin cepa "onion")
Common Name:-Onion (in English), Dungali (in Gujarati), Kanda-Pyaj (in Hindi)
II. Garlic
Classification (According to Bentham and Hooker's Classification System)
Kingdom: Plant
Division: Phanerogamia
Class: Monocotyledon
Series: Coronarieae
Family: Liliaceae
Genus: Allium
Species: sativum
Scientific Name: - *Allium sativum* L.
Common Name: - Garlic (in English), Lashan (in Gujarati), Lehsun (in Hindi)

2.2 Sample Collection
Collection was carried out from the selected districts of Gujarat. For onion, six districts were selected on the basis of popularity. They are-
1. Vankaner- Morbi,
2. Ranavav- Porbandar,
3. Tharad- Banaskantha,
4. Vadhavi- Junagadh,
5. Rajula- Amreli,
6. Himmatnagar- Sabarkantha

For garlic, three districts were selected on the basis of popularity. From Sabarkantha district, two talukas were selected to compare variability between talukas. They are-
1. Tharad- Banaskantha
2. Rajula- Amreli
3. Himmatnagar- Sabarkantha
4. Idar- Sabarkantha

2.3 Sample preparation
The plant materials were oven dried at 50˚C, and extracted using solvents chloroform as non-polar solvent, acetone as polar protic and methanol and distilled water as polar protic solvent.

2.4 Extraction
10gm finely ground plant powder was taken and kept in 100ml solvent (Acetone, Methanol, Chloroform and Aqueous) for 24 hours. The solution was then filtered using Whatmann filter paper No.42 (125mm) and kept at room temperature for the evaporation of the respective solvents. The dried extracts were then weighed for obtaining the extractive values of each plant material. The yield value of each extract was calculated by using the formula (Shilpakar, *et al.*, 2013) [5] given below:

$$\frac{\text{Extraction Obtained}}{\text{Total amount of crude drug}} \times 100$$

2.5 Qualitative Screening
Qualitative screening was performed as per the protocol followed by Prashant T, *et al*., 2011 and Sahirabanu K and Cathrine L, 2015 [1,6].

2.5.1 Alkaloids
Extracts were dissolved individually in dilute Hydrochloric acid and filtered Extracts and dilute Hydrochloric acid were taken in the ratio of 2:1 then the screening was done for detecting the presence of alkaloids.

2.5.1.1 Mayer's test
1ml filtrate was taken and into it was added 1ml Mayer's reagent, yellow colored precipitates were observed that indicated the presence of alkaloids.
Preparation of Mayer's Reagent: Dissolve 1.358g of Mercuric chloride in 60 ml of water & pour into a solution of 5g of Potassium Iodide in 10 ml of water. Add sufficient water to make 100 ml. White precipitate with most alkaloids in slightly acid solution.

2.5.1.2 Wagner's test
Filtrates were treated with Wagner's reagent (Iodine in Potassium Iodide). Formation of brown/reddish precipitate indicated the presence of alkaloids.
Preparation of Wagner's reagent**:** Dissolve 2g of Iodine and 6g of Potassium Iodide in 100ml of water.

2.5.1.3 Dragendroff's test
Filtrates were treated with Dragendroff's reagent (solution of Potassium Bismuth Iodide). Formation of red precipitate indicated the presence of alkaloids.
Preparation of Dragendroff's reagent**:** Bismuth sub-nitrate 1.7g, glacial acetic acid 20ml, water 80ml and 50% solution of potassium iodide in 100ml of water. Mix together and store as stock solution. 10ml of stock, 20ml glacial acetic acid and make up to 100ml with water gives the working solution.

2.5.2 Carbohydrates
Extracts were dissolved individually in 5ml distilled water and filtered. The filtrates were used to test for the presence of carbohydrates.

2.5.2.1 Molisch's test
2 ml of filtrate was treated with a drop of alcoholic alpha-naphthol (1:2) solution in a test tube. The mixture was shaken well and few drops of concentrated sulphuric acid (0.6 ml) were added slowly along the sides of test tube. Formation of the violet ring at the junction indicated the presence of carbohydrates.

2.5.2.2 Benedict's test
2 ml of filtrate was treated with 2 ml of Benedict's reagent and heated gently for 2 minutes. Orange red precipitate indicated the presence of reducing sugars.

2.5.2.3 Fehling's test
2 ml of filtrates were hydrolyzed with1ml of dilute Hydrochloric acid(1N) neutralized with1 ml of alkali(10% NaOH) and heated with 1 ml of Fehling's A and B solutions. Formation of red precipitate indicated the presence of reducing sugars.

2.5.3 Glycosides
Extracts were hydrolyzed with dilute Hydrochloric acidand then subjected to test for glycosides.

2.5.3.1 Modified Borntrager's test
2 ml of extract was treated with 2 ml of 5% Ferric Chloride solution and immersed in boiling water for about 5 minutes. The mixture was cooled and extracted with equal volumes of Benzene. The benzene layer was separated and treated with 1 ml of ammonia solution. Formation of rose pink color in the ammonical layer indicated the presence of anthranol glycosides.

2.5.3.2 Legal's test
2 ml of extracts were treated with 1 ml of 5%Sodium Nitropruside in 1 ml of pyridine and 1 ml of 10% sodium hydroxide. Formation of pink to blood red color indicated the presence of cardiac glycosides.

2.5.4 Saponins
2.5.4.1 Froth's test
0.5gm of extract was diluted with distilled water to 20 ml and this was shaken in a graduated cylinder for 15 minutes. Formation of 1 cm layer of foam indicated the presence of saponins.

2.5.4.2 Foam test
0.5gm of extract was shaken with 2 ml of water. If foam produced persists for ten minutes it indicated the presence of saponins.

2.5.5 Phytosterols
2.5.5.1 Salkowski's test
2 ml ofextracts were treated with1 ml of chloroform and filtered. The filtrates were treated with few drops of Concentrated Sulphuric acid, shaken and allowed to stand. Appearance of golden yellow color indicated the presence of triterpens.

2.5.5.2 Liebermann Burchard's test
2 ml of extracts were treated with1 ml of chloroform and filtered. 2 ml of filtrate was treated with few drops of acetic anhydride, boiled and cooled. 1 or 2 drops of concentrated

Sulphuric acid were added. Formation of brown ring at the junction indicated the presence of phytosterols.

2.5.6 Phenols
2.5.6.1 Ferric Chloride test
1 ml of extract was treated with 3-4 drops of 5% ferric chloride solution. Formation of bluish black color indicated the presence of phenols.

2.5.7 Tannins
2.5.7.1 Gelatin test
To the extract, 2ml of 1% gelatin solution containing sodium chloride was added. Formation of white precipitate indicated the presence of tannins.

2.5.7.2 Ferric chloride test
5 drops of 0.1% Ferric chloride was added to 2ml of extract, a brownish green or blueblack color indicated positive result.

2.5.8 Flavonoids
2.5.8.1 Alkaline Reagent test
1 ml of extract was treated with 1 ml of 10% Sodium hydroxide solution. Formation of intense yellow color, which becomes colorless on addition of 2 ml of dilute acid (1 N HCl), indicated the presence of flavonoids.

2.5.8.2 Lead acetate test
1 ml of extract was treated with 1 ml of 10 % lead acetate solution. Formation of yellow color precipitate indicated the presence of flavonoids.

2.5.9 Proteins and Amino acids
2.5.9.1 Xanthoproteic test
The extracts were treated with few drops of Concentrated Nitric acid. Formation of yellow color indicated the presence of proteins.

2.5.9.2 Millon's test
To 1 ml of filtrate 3 ml of Millon's reagent was added. A white precipitate indicated the presence of proteins.

2.5.9.3 Ninhydrin test
2 drops of ninhydrin solution (10 mg of ninhydrin in 200 ml of acetone) was added to 2 ml of aqueous filtrate. Appearance of purple color indicated the presence of amino acids.

2.5.9.4 Biuret's test
1 ml of filtrate was treated with 1 ml of 2% Copper Sulphate solution. To this 1ml of ethanol (95%) is added, followed by excess of potassium hydroxide pellets. Pink color ethanolic layer indicated the presence of protein.

2.5.10 Diterpenes
2.5.10.1 Copper acetate test
1 ml of extract was dissolved in water and treated with 1 ml of copper acetate solution. Formation of emerald green color indicated the presence of Diterpenes.

3. Results and Discussion
3.1 Yield Extractive Value
The yield extractive value was higher in methanolic and aqueous extract than acetonic and chloroformic extract for both the plants onion and garlic. For onion, result showed that the yielding extractive value was higher in onion from Vankaner-Morbi for methanolic extract and in onion from Rajula-Amreli for aqueous extract, while for the acetonic extract the yielding extractive value was higher in the onion from Himmatnagar-Sabarkantha and for the chloroformic extract it was higher in the onion from Vadhavi-Junagadh. (Fig.1)

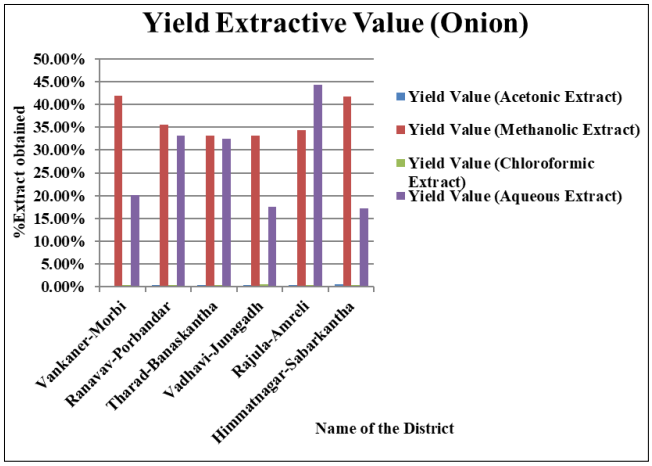

Fig 1: Yield Extractive Value for Onion Samples from Selected Districts of Gujarat

For garlic, result showed that the yielding extractive value was higher in garlic from Idar-Sabarkantha for methanolic extract and in garlic from Tharad-Banaskantha for aqueous extract, while for the acetonic extract the yielding extractive value was higher in the garlic from Rajula-Amreli and for the chloroformic extract it was also higher in the garlic from Rajula-Amreli. (Fig.2)

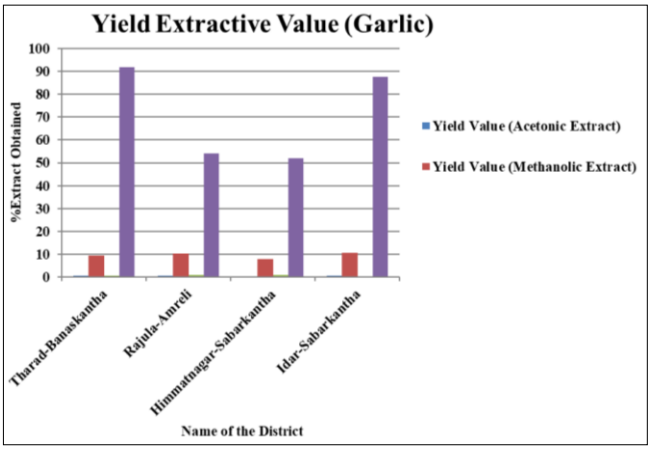

Fig 2: Yield Extractive Value for Garlic Samples from Selected Districts of Gujarat

3.2 Qualitative Screening
The phytochemical screening of the selected *Allium* species was performed according to the standard protocol of Prashant T, *et al.*, 2011[1] with required modification. For onion, the screening of the extracts prepared in solvents acetone, methanol, chloroform and distilled water showed the presence of Alkaloids, Saponins, Glycosides, Carbohydrates, Phytosterols, Flavonoids, Proteins and Amino Acids, Diterpens, Phenols and Tannins and the absence of Cardiac Glycosides. (Table. 1, 2, 3, 4, 5, 6)

Table 1: Qualitative screening of onion from Vankaner-Morbi (Where - = Absent, + =Low Concentration, ++ = Medium Concentration, +++ = High Concentration)

Phytochemicals	Name of tests	Name of Solvents			
		Acetone	Methanol	Chloroform	Aqueous
Alkaloids	**Mayer's test**	-	-	-	-
	Wagner's test	+	+	+++	+
	Dragendroff's test	+	+	++	+
Saponins	Froth's test	-	-	+	+
	Foam test	-	+	+	-
Glycosides	Modified Borntranger's test	+	+	+	+
	Legal's test	-	-	-	-
Carbohydrates	Molish's test	+	+	+	+
	Benedict's test	-	-	-	-
	Fehling's test	+	-	+++	-
Phytosterols	Salkowski's test	++	+++	+	+
	Liebermann Bur chard's test	++	+++	++	+
Flavonoids	Alkaline Reagent test	++	+++	+	++
	Lead Acetate test	-	+	-	-
Proteins And Amino Acids	Xanthoprotic test	+	+	-	+
	Millon's test	-	-	-	-
	Ninhydrin's test	-	-	-	-
	Biuret's test	+	-	+	-
Diterpenes	Copper Acetate test	+++	+++	+	+++
Phenols	Ferric Chloride Test	+	++	+	+
Tannins	Gelatin Test	+	++	+	++
	Ferric Chloride Test	+++	+++	++	+++

Table 2: Qualitative screening of onion from Ranavav-Porbandar (Where - = Absent, + =Low Concentration, ++ = Medium Concentration, +++ = High Concentration)ₛ

Phytochemicals	Name of tests	Name of Solvents			
		Acetone	Methanol	Chloroform	Aqueous
Alkaloids	**Mayer's test**	-	-	-	-
	Wagner's test	+	+	+	+
	Dragendroff's test	+	++	+	++
Saponins	Froth's test	+	-	+	-
	Foam test	+	-	+	-
Glycosides	Modified Borntranger's test	+++	++	+	++
	Legal's test	-	-	-	-
Carbohydrates	Molish's test	+	++	+	+
	Benedict's test	-	-	-	-
	Fehling's test	+	-	++	-
Phytosterols	Salkowski's test	+	++	+	+++
	Liebermann Bur chard's test	+++	+++	+	++
Flavonoids	Alkaline Reagent test	+	+++	++	++
	Lead Acetate test	-	+++	++	+++
Proteins And Amino Acids	Xanthoprotic test	+	+++	++	+++
	Millon's test	-	-	-	-
	Ninhydrin test	-	-	-	-
	Biuret's test	+	+	+	+
Diterpenes	Copper Acetate test	+++	+++	+	++
Phenols	Ferric Chloride Test	+	+	-	+
Tannins	Gelatin Test	+	+	++	+
	Ferric Chloride Test	++	++	+	++

Table 3: Qualitative screening of onion from Tharad-Banaskantha (Where - = Absent, + =Low Concentration, ++ = Medium Concentration, +++ = High Concentration)

Phytochemicals	Name of tests	Name of Solvents			
		Acetone	Methanol	Chloroform	Aqueous
Alkaloids	**Mayer's test**	-	-	-	-
	Wagner's test	++	++	+++	++
	Dragendroff's test	++	++	+	+
Saponins	Froth's test	-	+	+++	-

	Foam test	-	+	+++	-
Glycosides	Modified Borntranger's test	+	+	+	+
	Legal's test	-	-	-	-
Carbohydrates	Molish's test	+++	++	+	++
	Benedict's test	-	-	-	-
	Fehling's test	-	-	+	++
Phytosterols	Salkowski's test	++	++	+	+++
	Liebermann	++	++	+	+
	Bur chard's test				
Flavonoids	Alkaline Reagent test	++	+++	+	+++
	Lead acetate test	-	-	-	-
Proteins And Amino Acids	Xanthoprotic test	+	+	+	+
	Millon's test	-	-	-	-
	Ninhydrin test	-	-	-	-
	Biuret's test	-	-	-	-
Diterpenes	Copper Acetate test	+	+	+	+
Phenols	Ferric Chloride Test	+	+	+	+
Tannins	Gelatin Test	+	++	+	+++
	Ferric chloride test	-	-	-	-

Table 4: Qualitative screening of onion from Vadhavi-Junagadh (Where - = Absent, + =Low Concentration, ++ = Medium Concentration, +++ = High Concentration)

Phytochemicals	**Name of tests**	**Name of Solvents**			
		Acetone	**Methanol**	**Chloroform**	**Aqueous**
Alkaloids	Mayer's test	-	-	-	-
	Wagner's test	+	+	+	+
	Dragendroff's test	-	-	-	-
Saponins	Froth's test	+	+	++	+
	Foam test	+	+	++	+
Glycosides	Modified Borntranger's test	++	++	+	+
	Legal's test	-	-	-	-
Carbohydrates	Molish's test	+++	+	+	+++
	Benedict's test	-	-	-	-
	Fehling's test	+++	++	+	+
Phytosterols	Salkowski's test	++	+++	+	++
	Liebermann	++	+++	++	++
	Bur chard's test				
Flavonoids	Alkaline Reagent test	-	-	-	-
	Lead Acetate test	+	+	++	+
Proteins And Amino Acids	Xanthoprotic test	+++	+++	+	++
	Millon's test	-	-	-	-
	Ninhydrin test	-	-	-	-
	Biuret's test	+	+	-	-
Diterpenes	Copper Acetate test	++	+	++	+
Phenols	Ferric Chloride Test	+	+	+	+
Tannins	Gelatin test	+++	++	+	+
	Ferric Chloride Test	+	+	+	+

Table 5: Qualitative screening of onion from Rajula-Amreli (Where - = Absent, + =Low Concentration, ++ = Medium Concentration, +++ = High Concentration)

Phytochemicals	**Name of tests**	**Name of Solvents**			
		Acetone	**Methanol**	**Chloroform**	**Aqueous**
Alkaloids	**Mayer's test**	-	-	-	-
	Wagner's test	+	+	+++	+
	Dragendroff's test	++	+	+	+
Saponins	Froth's test	++	++	++	+++
	Foam test	+++	++	++	++
Glycosides	Modified Borntranger's test	++	++	+++	++
	Legal's test	-	-	-	-
Carbohydrates	Molish's test	+	++	++	+
	Benedict's test	-	-	-	-
	Fehling's test	+	+	+++	+
Phytosterols	Salkowski's test	+	+	+	++
	Liebermann	-	+	-	-
	Bur chard's test				

Flavonoids	Alkaline Reagent test	-	-	-	-
	Lead Acetate test	+	+	+	+
Proteins And Amino Acids	Xanthoprotic test	+	+	+	+
	Millon's test	-	-	-	-
	Ninhydrin test	-	-	-	-
	Biuret's test	+++	+++	+	++
Diterpenes	Copper Acetate test	+++	+++	++	+
Phenols	Ferric Chloride Test	+	+	+	+
Tannins	Gelatin Test	+	+	++	+
	Ferric Chloride Test	+	+	+	+

Table 6: Qualitative screening of onion from Himmatnagar-Sabarkantha district (Where - = Absent, + =Low Concentration, ++ = Medium Concentration, +++ = High Concentration)

Phytochemicals	**Name of tests**	**Name of Solvents**			
		Acetone	**Methanol**	**Chloroform**	**Aqueous**
Alkaloids	**Mayer's test**	++	+	+	+
	Wagner's test	+	+	+	+
	Dragendroff's test	+	+	+	+
Saponins	Froth's test	+	+	+	++
	Foam test	+	++	+	++
Glycosides	Modified Borntranger's test	++	++	++	++
	Legal's test	-	-	-	-
Carbohydrates	Molish's test	+++	++	++	+
	Benedict's test	-	-	-	-
	Fehling's test	++	+++	+	++
Phytosterols	Salkowski's test	+++	+	++	++
	Liebermann	+	++	+++	+
	Bur chard's test				
Flavonoids	Alkaline Reagent test	++	+	++	++
	Lead Acetate test	-	-	-	-
Proteins And Amino Acids	Xanthoprotic test	+	+	+++	++
	Millon's test	-	-	-	-
	Ninhydrin test	-	-	-	-
	Biuret's test	+	+	+	+
Diterpenes	Copper Acetate test	+	+	+	+
Phenols	Ferric Chloride Test	+++	+++	+	++
Tannins	Gelatin Test	++	+	+	+
	Ferric Chloride Test	+++	+++	+	++

For garlic, the screening of the extracts prepared in solvents acetone, methanol, chloroform and distilled water showed the presence of Alkaloids, Saponins, Glycosides, Carbohydrates, Phytosterols, Flavonoids, Proteins and Amino Acids, Diterpens, Phenols and Tannins and the absence of Cardiac Glycosides which is same as compared to results of qualitative screening of onion. (Table. 7, 8.9, 10)

Table 7: Qualitative screening of garlic from Tharad-Banaskantha district (Where - = Absent, + =Low Concentration, ++ = Medium Concentration, +++ = High Concentration)

Phytochemicals	**Name of tests**	**Name of Solvents**			
		Acetone	**Methanol**	**Chloroform**	**Aqueous**
Alkaloids	**Mayer's test**	-	-	-	-
	Wagner's test	+	++	+++	+
	Dragendroff's test	++	+	+	+
Saponins	Froth's test	+	+	+	+
	Foam test	+	+	+	+
Glycosides	Modified Borntranger's test	+	+	+	+
	Legal's test	+++	-	++	-
Carbohydrates	Molish's test	+	+	+	+
	Benedict's test	-	-	-	-
	Fehling's test	+	++	+++	+
Phytosterols	Salkowski's test	++	+	+	+++
	Liebermann	+	+	++	+++
	Bur chard's test				
Flavonoids	Alkaline Reagent test	+	+	++	+
	Lead Acetate test	+	+	+	+
Proteins And Amino Acids	Xanthoprotic test	+	+++	+	++
	Millon's test	-	-	-	-

	Ninhydrin test	-	-	-	-
	Biuret's test	+	+	+	+
Diterpenes	Copper Acetate test	+++	++	++	+
Phenols	Ferric Chloride Test	++	++	+	+++
Tannins	Gelatin Test	+++	++	+++	+
	Ferric Chloride Test	++	++	+	+++

Table 8: Qualitative screening of garlic from Rajula-Amreli district (Where - = Absent, + =Low Concentration, ++ = Medium Concentration, +++ = High Concentration)

Phytochemicals	Name of tests	Name of Solvents			
		Acetone	Methanol	Chloroform	Aqueous
Alkaloids	**Mayer's test**	-	-	-	+
	Wagner's test	++	++	+++	+
	Dragendroff's test	+++	++	+	++
Saponins	Froth's test	+	+	+	+
	Foam test	+	+	+	+
Glycosides	Modified Borntranger's test	+	+	++	+
	Legal's test	+	-	-	-
Carbohydrates	Molish's test	+	+	+	+
	Benedict's test	-	-	-	-
	Fehling's test	+	+	++	+
Phytosterols	Salkowski's test	++	+	++	+++
	Liebermann Bur chard's test	++	+	+	+++
Flavonoids	Alkaline Reagent test	+	+	+	++
	Lead Acetate test	+	+	+	++
Proteins And Amino Acids	Xanthoprotic test	++	+	+	+++
	Millon's test	-	-	-	-
	Ninhydrin test	-	-	-	-
	Biuret's test	+	+	+	+
Diterpenes	Copper Acetate test	++	++	+	+++
Phenols	Ferric Chloride Test	+	+	+	+
Tannins	Gelatin Test	+	+	+	+
	Ferric Chloride Test	+	+	+	+

Table 9: Qualitative screening of garlic from Himmatnagar-Sabarkantha district (Where - = Absent, + =Low Concentration, ++ = Medium Concentration, +++ = High Concentration)

Phytochemicals	Name of tests	Name of Solvents			
		Acetone	Methanol	Chloroform	Aqueous
Alkaloids	**Mayer's test**	-	-	-	+
	Wagner's test	+	+++	++	+
	Dragendroff's test	+++	+	+	++
Saponins	Froth's test	+	+	+	+
	Foam test	+	+	+	+
Glycosides	Modified Borntranger's test	+	+	+	+
	Legal's test	+	-	-	-
Carbohydrates	Molish's test	+	+	+	+
	Benedict's test	-	-	-	-
	Fehling's test	+	+	+++	++
Phytosterols	Salkowski's test	++	+	++	+++
	Liebermann Bur chard's test	+	+	+	++
Flavonoids	Alkaline Reagent test	+	+	+	++
	Lead Acetate test	+	+	+	++
Proteins And Amino Acids	Xanthoprotic test	+	+	++	+++
	Millon's test	-	-	-	-
	Ninhydrin test	-	-	-	-
	Biuret's test	+	+	+	+
Diterpenes	Copper Acetate test	++	++	+	+++
Phenols	Ferric Chloride Test	+	+	+	+
Tannins	Gelatin Test	+	+	+	+
	Ferric Chloride Test	+	+	+	+

Table 10: Qualitative screening of garlic from Idar-Sabarkantha district (Where - = Absent, + =Low Concentration, ++ = Medium Concentration, +++ = High Concentration)

Phytochemicals	Name of tests	Name of Solvents			
		Acetone	Methanol	Chloroform	Aqueous
Alkaloids	**Mayer's test**	-	-	-	-
	Wagner's test	++	++	+++	+
	Dragendroff's test	++	+	+	+
Saponins	Froth's test	+	+	+	+
	Foam test	+	+	+	+
Glycosides	Modified Borntranger's test	+	+	++	+
	Legal's test	+++	-	++	-
Carbohydrates	Molish's test	+	+	+	+
	Benedict's test	-	-	-	-
	Fehling's test	+	+	+++	+
Phytosterols	Salkowski's test	+	++	+	+++
	Liebermann	+++	+	+	++
	Bur chard's test				
Flavonoids	Alkaline Reagent test	+	+	++	+
	Lead Acetate test	+	+	+	+
Proteins And Amino Acids	Xanthoprotic test	++	+	+	++
	Millon's test	-	-	-	-
	Ninhydrin test	-	-	-	-
	Biuret's test	+	+	+	+
Diterpenes	Copper Acetate test	+++	++	++	+
Phenols	Ferric Chloride Test	++	++	+	+++
Tannins	Gelatin Test	+++	+	++	+
	Ferric Chloride Test	++	++	+	+++

3.3 Discussion

For the extracts of onion prepared with solvents methanol and distilled water, the presence of Alkaloids, Saponins, Glycosides, Carbohydrates, Phytosterols, Flavonoids, Proteins and Amino Acids, Diterpens, Phenols and Tannins and the absence of Cardiac Glycosides were seen which was found to be similar with the experiment performed by (Ponnulakshmi R and Balasubramanians E, 2013) [7], (S. Boukeria, *et al*. 2016) [8] and (Abhijeet Bidkar, *et al*., 2012) [7, 8, 9]. While for the extracts prepared in acetone and chloroform the presence of Alkaloids, Saponins, Glycosides, Carbohydrates, Phytosterols, Flavonoids, Proteins and Amino Acids, Diterpens, Phenols and Tannins and the absence of Cardiac Glycosides were seen, there was not a single review available for that. So, results for acetonic extract and chloroformic extract were new as far as the research papers were concerned. Even there was not a single review available showing the comparison of the different extracts of onion from the selected districts of Gujarat.

For the extracts of garlic prepared with solvents methanol and distilled water, the presence of Alkaloids, Saponins, Glycosides, Carbohydrates, Phytosterols, Flavonoids, Proteins and Amino Acids, Diterpens, Phenols and Tannins and the absence of Cardiac Glycosides were seen which was found to be similar with the experiment performed by (Garba I., *et al*., 2013) [10], (O. O. Akinmusire, *et al*., 2014) [11] and (Ameh G. I., *et al*., 2013) [12], (S. Boukeria, *et al*.,2016) [8] and (Vandana Singh, *et al*., 2017) [10, 11, 12, 8, 13]. While for the extracts prepared in acetone and chloroform the presence of Alkaloids, Saponins, Glycosides, Carbohydrates, Phytosterols, Flavonoids, Proteins and Amino Acids, Diterpens, Phenols and Tannins and the absence of Cardiac Glycosides were seen, there was not a single review available for that. So, results for acetonic extract and chloroformic extract were new as far as the research papers were concerned. Even there was not a single review available showing the comparison of the different extracts of garlic from the selected districts of Gujarat.

4. Conclusion

The present study shows that yield extractive value was high in the methanolic and aqueous solvents. So, we can conclude that these two solvents are preferable for the extraction of onion and garlic. For onion, it was higher in the methanolic extract of Vankaner-Morbi and aqueous extract of Rajula-Amreli. For garlic, it was higher in the methanolic extract of Idar-Sabarkantha and aqueous extract of Tharad-Banaskantha. So, we can conclude that samples collected from these places are best for the further applications. Here, we can say that *Allium cepa* L. and *Allium sativum* L. are the species having bioactive compounds and major source of phytochemicals. These phytochemicals are only responsible for the medicinal properties of these plants. Therefore these plants are known as key species for the curing of various dangerous diseases.

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6. References

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