using chemical fertilizer decreases the nutritional value of the plant because of soil acidification, biological fertilizer reduction, and other ecological problems. Natural fertilizers not only improve the food quality but also improve soil physical and microbial properties as reported by Babu et al., (2007). According to Mercy *et al* (2014) fruit peels are good source of nutrients like potassium, calcium, iron, zinc etc. These are cheapest and harmless materials used for plant growth.The purpose of any fertilizer is to increase the amount of nutrients in soil that make it more fertile and friendly to plant growth. Banana and Pomegranate peels add nutrients and nitrogen to the soil as they decompose. Both peels are particularly effective for use as a natural fertilizer. They rot quickly if burried, offering rich stores for vital nutrients to the soil, including potassium, calcium, sulphur, phosphorus, magnesium and sodium. Selected fruit peels of Orange, Pomegranate and Banana were used as natural fertilizer in the present research work to study its physiological effect on the plant *Spinacia oleracea,* suggesting it a better environmental friendly alternative potential to chemical fertilizers.

Materials and Methods :

The seeds and pots were purchased from the local market of Patna. The research work were done in the laboratory of department of botany, Patna Women's College.

Experimental set up : For each test sample, in triplicates, 12 pots were taken. Each of the pots were filled with 1kg of soil. 6gm of powder of each fruit peel was dissolved in 100ml of distilled water and applied to the soil at the interval of 7 days. 3 pots were treated with, chemical fertilizer ammonium nitrate, as control (Rafiq *et al* 2010). 50 seeds were sown in each of the pot. 100ml of tap water added to the pots at regular interval of one day.

Preliminary Screening of Phytocompounds : For the detection of the phytochemicals qualitatively, the test were conducted according to the standard protocol as reported by Chaturvedi *et al* (2013). After 7 days 50gm fresh leaves of the spinach plant were collected from each pot sample and washedunder tap water. The leaves were crushed in mortar-pestle and mixed with 50ml of distilled water to make extract in the ratio 1:1.

Estimation of Iron, protein and Vitamin C by UV-vis Spectrophotometer :

For estimation of Iron 6gm of spinach leaves of each test sample were taken and crushed in mortar-pestle with the help of 5ml distilled water. To the filterate 10mol L^{-1} Hydrochloric acid was added and stirred for 5 minutes. 10ml of 1ml L^{-1} Ammonium thiocyanate solution was also added to the solution. The absorbance of the solution was taken at 490nm (Sandell, 1994).

For estimation of protein 1ml of leave extract was dissolved in 10ml of Acetate buffer (0.2M Acetic acid+0.2M Sodium acetate).The solution was centrifuged at 2500rpm, for 10 minutes. In 1ml of supernatant, 5ml of Alkaline solution (Alkaline sodium carbonate+2% sodium potassium tartrate) was added, and left for 10 minutes. To the mixture 0.5ml of folin reagent was added then the absorbance was taken at 750nm by (Lowry *et al* 1951).

For the estimation of Vitamin C,5gm of leave sample were taken freshly and washed in tap water. The plant sample were crushed in mortar-pestle and homogenized with 25ml of acetic acid solution (10% acetic acid). The solution was filtered by the help of muslin cloth and then filtrate was collected for the estimation of vitamin C. 1ml of bromine water was added to the filtrate solution until the solution become coloured. To removes the excess bromine 1ml of thiourea solution was added, thus the clear solution was obtained. After that 2,4-dinitrophenyl hydrazine solution was added and absorbance was taken at 280nm (Majeed *et al* 2007).

Results and Discussion :

A natural fertilizer provide nutrient, which are very essential for the plant growth. Fruit peel

powders are rich source of nutrient and minerals, so these are good for the growth of spinach plant. The result of this work shows that the different fruit peels fertilizer have significant effect on the growth and phytonutrient of spinach leaves.

Table 1. Effect of different fertilizers on seed germination and seedling height

S. No.	Sample peel fertilizer	No. of seed germination in seven days	Size of seedling in 7 days	Size of seedling after 14 days	Size of seedling after 21 days
1.	Banana	45	3cm	3cm	3.5cm
2.	Orange	40	4cm	4.6cm	4.8cm
3.	Pomegranate	48	5.4cm	5.8cm	6cm
4.	Control	30	6.8cm	7cm	7cm

Table 2. Phytochemical screening of aqueous extract of *Spinacia oleracea* leaves

S. No.	Phytochemicals	Test performed	Observations	Inference
1.	Flavonoid	Shinoda test	Red crimson colour	+
2.	Phenol	Ferric chloride test	Red colour	+
3.	Protein	Biuret test	Violet colour	+
4.	Glycosides	Liebermann's test	No change in colour	-
5.	Saponins	Froth test	No stable foam	-
6.	Carbohydrate	Molisch test	Purple ring formed	+
7.	Alkaloid	Mayer's test	Precipitate formed	+
8.	Vitamin C	Indophenol test	Colourless solution	+
9.	Tannin	Lead acetate test	Green precipitation formed	+
10.	Iron	Ammonium thiocyanate test	Blood red colour	+
11.	Calcium	Ammonium Oxalate test	White precipitate	+
12.	Phosphorus	Ammonium molybdate test	Bright yellow precipitate	+
13.	Magnesium	Ammonium hydroxide test	Gelatinous white precipitate	+
14.	Manganese	Potassium permanganate test	Dark brown precipitate	+
15.	Zinc	Potassium ferrocyanide test	Cream precipitate	+

Key: +(present) ; -(absent)

Table 3. UV- vis spectrophotometric estimation of protein

S.No.	Sample peel fertilizer	Absorbance at 750nm	Concentration (µg/ml)
1.	Banana	0.601	382.5µg/ml
2.	Orange	0.501	381.6µg/ml
3.	Pomegranate	0.512	456.6µg/ml
4.	Control	0.448	329.1µg/ml

Table 4. Estimation of iron of different test samples

S.NO	Sample peel fertilizer	Absorbance at 490nm	Concentration (mol L^{-1})
1.	Banana	0.933nm	8×10^{-5}mol L^{-1}
2.	Orange	0.778nm	7.09×10^{-5}mol L^{-1}
3.	Pomegranate	1.097nm	8.02×10^{-5}mol L^{-1}
4.	Control	0.716nm	4.02×10^{-5}mol L^{-1}

Table 5. UV- vis spectrophotometric estimation of Vitamin C

S.NO	Sample peel fertilizer	Absorbance at 512nm	Concentration (µg/ml)
1.	Banana	3.863nm	289.0µg/ml
2.	Orange	3.870nm	183.5µg/ml
3.	Pomegranate	3.876nm	290µg/ml
4.	Control	3.790nm	179.7µg/ml

Table 1 shows the growth of *Spinacia oleracea* influenced by different fruit peel fertilizer.The Pomegranate fruit peel fertilizer showed maximum viability of seeds. Number of seeds germinated were 48 out of 50 seeds, but it was found that the size of seedling were largest in chemical fertilizer and the smallest seedling were observed in the pot of Banana fruit peel fertilizer. Least viability of seeds was observed in chemical fertilizer.

Table 2 shows the presence and absence of different phytochemicals in *Spinacia oleracea* which makes it one of the most important source of

phytonutrient contents as reported earlier (Farah *et al* 2012).Phytochemicals are chemical compounds produced by plants, generally to help them thrive competitors, predators or pathogens.

Protein are macromolecules formed by amino acids. Protein provide strength to the body and important for growth and development. Protein is an essential nutrient for healthy body growth and function, as it plays an important role in making and repairing cells. Protein helps to build and maintain skin, muscle and bones in the body. cThe result shown in Table 3 indicate that Proteinconcentration of Spinach leaves was maximum in Pomegranate (382.5µm/ml) and minimum in control (329.1µm/ml).

The spinach plant is a rich source of iron. Iron is the mineral that serves several important function like it carry oxygen throughout the body and making red blood cell. Iron also has a role in a variety of other important processes in the body. A shortage of iron in the blood can lead to a range of serious health problems, including iron deficiency anemia. The result of table 4 shows that the concentration of iron was maximum in pomegranate (8.02×10^{-6}mol L^{-1}) and minimum in control (4.02×10^{-6}mol L^{-1}).

Vitamin C is a powerful antioxidant that promotes skin health and immune function. It is necessary for the growth, development and repair of all body tissues. It is involved in many body functions, including formation of collagen, absorption of iron, the immune system, wound healing and in maintenance of cartilage, bone and teeth. Deficiency of Vitamin C can lead to scurvy characterized by weakness, anemia,, bleeding and loose teeth as reported by Michels *et al* (2012). The results of table 5 shows that the vitamin C concentration was maximum in pomegranate (290µg/m) and minimum in control (179.7µg/ml).

Conclusion :

The research work revealed that the Pomegranate peel fertilizer applied soil shows maximum positive effect on the nutritional component of the plant sample. The contents of phytochemical was also highest in Pomegranate fertilizer applied soil due to high nitrogen content in peels of Pomegranate. Vitamin, Iron and Protein concentration was maximum in the plant grown Pomegranate fertilizer applied soil.Growth of spinach plant grown in Banana peel fertilizer applied soil was also good but was a little bit less than Pomegranate peel fertilizer applied soil. Hence it established the fact that Pomegranate peel fertilizer is best suited for the propagation of *Spinacia oleracea*. Banana peel fertilizer occupied the second position in enhancing the nutritional value of the plantThrough this research work it was observed that the minimum growth and phytochemical contents was found in chemical fertilizer applied soil plant. Hence it is concluded that Pomegranate fruit peel fertilizer is best for the growth of *Spinacia oleracea.*

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