Review of Literature
Chapter - II

REVIEW OF LITERATURE

The relevant informations available on nutritional studies on guava and other fruit crops has been used as base for planning and execution of the present investigation. Review are briefly present in this chapter under following heads:

2.1 Flowering, Fruiting and Yield:

Sinha et al. (1961) advocated that the fruit yield of guava was positively correlated with N levels.

Tiwari et al. (1968) reported that foliar application of nitrogen on guava trees increased the percentage of flowers and fruit set.

Arora and Singh (1970) reported that the yield of guava was increased by foliar application of 1 or 2 per cent urea.

Singh (1972) reported that mango trees urea and double superphosphate at 2 per cent or 4 per cent were applied singly or in combination in December, April and August. Urea significantly increased panicle, length, duration of flowering, fruit set and yield per panicle and reduced sex ratio and the percentage of fruit drop.

Doraipandian and Shanmugavelu (1972) reported that when mango trees cv. Bangelora were sprayed three times at 15 days intervals with 1 or 2 per cent urea during the flowering stage, these treatments resulted in mean yield increases.

Singh et al. (1973) reported that foliar application of urea increased the length of terminal shoots in mango, number of leaves per shoot,
leaf area per shoot and leaf N and water content. The highest urea concentration of 6 per cent was most effective but caused slight leaf burning. The 4 per cent is therefore recommended.

Rajput and Tiwri (1975) reported that urea spray of 2 per cent, 4 per cent or 6 per cent applied to the mango cvs. Langra, Dashehari and Totapari. The treatments reduced the duration of flowering but increased panicle length, fruit set and fruit retention per panicle, cultivar differences and cv. x N interactions were significant.

Singh (1975) reported on mango cv. Langra trees were sprayed 3 times a year with nitrogen as urea and phosphorus as double superphosphate each at 2 or 4 per cent the significant improvements the fresh and dry weight, moisture per cent, sugar, acidity, ascorbic acid and T.S.S.

Singh (1975) reported on mango cv. Chausa sprayed with urea and superphosphate each at 0 per cent, 2 per cent or 4 per cent either alone or together at 4th intervals from December 1969 to August 1971 and fruit were harvested in June, 1970 and June 1971. Fruit size, ascorbic acid sugar and T.S.S. content were enhanced by foliar application.

Chundawat et al. (1976) studied with 8 guava cvs. fruits were generally larger during the rainy season but fruits from the winter season (dry season) crop developed more uniform colour had thicker skin and stored better. The chemical composition of fruits from the winter season crop was superior than the rainy season crop.

Singh et al. (1976) observed that sprayed of urea 2 per cent, 4 per cent or 6 per cent applied as a foliar spray on mango trees to increased terminal shoot growth, total leaf number, leaf area per shoot and leaf moisture and N contents. The highest concentration gave the greatest response but some leaf scorch results.
Singh and Rajput (1976) reported that yield of guava cv. Allahabad safeda was 55.50 kg in winter and 68.50 kg per tree in rainy season with foliar application of 6 per cent potassium in form of murate of potash over control (44.5 kg per tree in winter and 57.9 kg per tree in rainy season.

Singh and Rajput (1977) reported highest number of flowers per shoot (3.65), fruit set (75.5%), fruit retention (38.8%) and yield (67.91 kg per tree) with foliar application of 6 per cent super phosphate in guava cv. Allahabad Safeda. They also found 2.39 flowers per shoot, 69.3 per cent fruit set, 29.8 per cent fruit retention and 55.81 kg yield per plant in winter and 3.65 flowers per shoot 76.2 per cent fruit set, 44.0 per cent fruit retention and 68.38 kg yield per tree in rainy season.

Singh and Rajput (1977) reported that sprayed of urea at (0 - 6%) on guava trees cv. Allahabad Safeda in mid July and mid January and the effects were assessed on fruit composition at the mature ripe and over ripe stage. Reducing and total sugar, ascorbic acid contents were raised by urea at all concentration, 4 per cent being most effective. Winter harvested fruits better quality than rainy season.

Sharma et al. (1977) reported in trails at two places in mango urea (2 - 10%) was applied at the full bloom or pea stage followed by a second application after 5 weeks and 15 days respectively. Fruit numbers and yield were highest with the 4 per cent application at both stage. Fruit maturity was delayed up to 15 days with the highest concentration compared with control treatments.

Azzouz and Dahshan (1981) observed the application of nitrogen and micro-nutrients on mango cv. Taimour to control the flower malformation.
Singh and Rajput (1981) reporting that fruit yield in guava could be increased with the foliar application of urea (4 per cent) in mid July or mid January for rainy and winter crop, respectively.

Singh et al. (1983) studied on guava the effect of foliar spray of urea and boric acid at 2 - 3 per cent and 0.1 - 0.3 per cent were applied on 1st October and twice more at 15 days intervals, the largest fruit (125.8 g) of the best quality (14.4 per cent) T.S.S. and 8.2 per cent total sugar were produced on trees treated with 3 per cent urea + 0.3 per cent boric acid.

Reddy and Majanudara (1983) reported that sprayed orthophosphoric acid (0.5%) alone and with 2 per cent urea on mango trees in September, November, March or in all three month. The treatment of Phosphorus in leaves and fruits was increased by the spray, especially urea was affected on fruit set and yield were improved.

Reddy (1984) reported that spraying orthophosphoric acid at 0.5 per cent alone and with urea at 2 per cent applied on mango in September, November or March. Recovery of the applied vegetative growth shoot and increased the number of leaves and their areas. These effects were considered promising for inducing fruit development in the following off year.

Sharma (1984) studied on Banana at 375 gm, nitrogen in the form of urea applied at soil and foliar spray in equal proportion resulted in the highest and girth of pseudostem. The plants also flowered earlier with more number of fingers per bunch and heavier bunch.

Singh (1985) also noted that spraying of 4 or 6 per cent increased the yield of guava.

Singh (1985) reported increase in the number of flowers per shoot and fruit retention with application of urea 4 or 6 per cent in the month of January and July in guava.
Singh (1985) observed that foliar application of 4 per cent or 6 per cent of urea in January and July for 2 years increased the length of terminal shoots, leaf area per shoot, fruit retention fruit weight, diameter and fruit yield per tree over control and reduced the duration of following. The weight of seeds per fruit was unaffected. Mean yields were 56, 62.2 and 67.3 kg per tree for the control, 4 per cent and 6 per cent treatment respectively.

Mansour et al. (1985) reported to studied of two years trail on 17 year old guava trees of 2, 4 and 6 per cent foliar sprayed in early August and February in one year at 1, 2 and 3 per cent in mid July and February in other years. In the first year urea at 2 per cent and 4 per cent increased the fruit set but the 3 per cent decreased it and 2 per cent urea gave the yield (21.5 kg) per tree. The controlled yield were (20.9 kg) and (16.0 kg) per tree. In 1st and IIInd year respectively.

Singh (1985) increased the number of flowes per shoot, fruit retention, yield, fruit quality by increasing the T.S.S. and total sugar. Reducing and fruit acidity with application of urea 4 or 6 per cent in the month of January and July in guava.

Singh et al. (1991) reported on mango cv. Amrapali with 3 per cent urea sprayed to increased the highest fruit retention, yield per tree and improved the size weight, T.S.S., ascorbic acid, reducing sugra. Tota sugar with 5 per cent urea.

Sharma and Sharma (1992) reported the foliar sprayed with 3 per cent N, 1 per cent P and 1 per cent K combination of treatment used increased the highest number of leaves per shoot (10), terminal shoot length (14.76 cm), fruit set (62.0%), fruit retention (30.5%) and fruit yield (28.36 kg) per tree in guava.
Benerwal et al. (1992) reported the sprayed of 1.5 per cent urea to improved the bunch weight, bunch volume, berry size and yield and 0.5 per cent urea + 1.0 per cent potassium sulphate significantly increased the T.S.S. and reducing sugar in grapes cv. perlet.

Other Basal Application of Nutrient to Effect Flowering, Fruiting and Yield:

Naik (1949) advocated the need for proper nutrition of guava trees for better fruiting and yielded.

Rangacharlu (1954) from Andhra Pradesh reported that the application of nitrogen per tree per year produced higher yield in guava.

Sinha et al. (1961) revealed that 454 kg nitrogen per tree per year proved better for increasing the yield of guava trees.

Singh and Shrivastava (1978) from U.P. recommended 60 g N + 40 g. P + 40 g. K per plant per year to guava plant for higher yield.

Mitra and Bose (1985) reported that the highest yield (42.8 kg per plant) was recorded with soil application of 260 g. N + 160 g. P₂O₅ + 260 g. K₂O per tree in two split doses.

The highest yield of guava was obtained with 500 g. N, 300 g. P₂O₅ and 600 g. K₂O per plant per year at Central Horticultural Experimental Station, Ranchi (Anon., 1988).

Kumar et al. (1996) reported highest yield (39.59 kg per tree) of Allahabad Safeda with application of 600 g. N per tree per year.

Tomar et al. (1998) reported that N (460 g.) application per plant improved values for the yield attributes and yield per plant over the control of 7 year old guava cv. Gwalior - 27.
Huchche et al. (1998) advocated that highest number of fruits (900 fruits per plant) of Nagpur Mandrain was obtained with soil application of 800 g N + 200 g P + 100 g K per plant per year over control.

Ram et al. (1999) observed highest number of fruits and yield i.e. 125 fruits and 31.9 kg respectively per plant per year of guava cv. Sardar with soil application of 600 g neem coated urea/plant/year, which was significantly higher than with all the other treatments than the control.

2.2 Micro-nutrients:

Rajput and Chand (1975) reported that the significant of growth flowering, fruiting and yield by foliar application of zinc sulphate and boric acid on guava.

Rajput et al. (1976) reported that significantly improved the growth, flowering fruiting in mango cv. Langra with foliar application of Boron.

Rajput et al. (1976) reported that foliar application of zinc sulphate on mango improved the growth and yield.

Singh et al. (1982) reported that increase in the growth, flowering, fruiting and yiled with the application of Magnesium at 0.4 per cent in the month of February and July for raining or winter season in guava.

Singh and Singh (1982) reported that application of Mg at 0.1 - 0.4 per cent the best result of fruit yield and quality of 0.3 per cent spray of Magnesium in both season in the month of February and July on winter season guava cv. Allahabad Safeda.

Mansour et al. (1981) reported that application of zinc sulphate on guava at 0.5 or 1 per cent to increased the fruit set and fruit yield of 206 to 964 per tree as compare to control 160 - 373 fruits per tree.
Azzouz and Dahshan (1981) observed that application of micro-nutrient on mango cv. Taimur to controled the malformation and increased the yield.

Singh et al. (1982) reported that increase in growth, flowering, fruiting and yield with the application of Magnesium at 0.4 per cent in the month of February or July for rainy or winter season guava crop.

Singh and Singh (1982) reported that application of Mg at 0.1 - 0.4 per cent applied. The best result of fruit quality and yield at 0.3 per cent spray of Magnesium in both season in the month of July of rainy or winter season guava cv. Allahabad Safeda.

Singh et al. (1983) studied on guava the effect of foliar spray of urea and boric acid at 2 - 3 per cent and 0.1 - 0.3 per cent were application 1st October and twice at 15 days intervals. The largest fruit (125.8 g.) of the best quality (14.4 per cent) T.S.S. and 8.2 per cent total sugar were produced with treated of urea + 0.3 per cent boric acid.

Singh and Singh (1984) observed that sprayed of Magnesium at 0.1, 0.2, 0.3 and 0.4 per cent on guava cv. Allahabad Safeda in both season bets result was found at 0.3 per cent to fruit yield and quality.

Joon et al. (1984) studied on Ber with urea and zinc sulphate sprayed on physico-chemical composition of fruits. The foliar application of urea (1.0, 1.5 and 2.0 per cent) and zinc (0.4, 0.6 and 0.8 per cent) and their combinations in the month of November - December significantly effect the fruit size yield and quality by the nitrogen 2 per cent + 0.8 per cent of zinc in comparison to other treatments.

Khera et al. (1985) reported that 13 years old orange tree growing on soil with 0.25 and 3.5 ppm available Zn and Fe each at 0.4 per cent as a foliar spray 3 times in 12 month at 500 gm/tree as a soil application
in March. The highest yield and good quality of fruits obtained from trees receiving soil applied Zn.

Ghosh (1986) studied in two year trials on guava cv. L-49 trees were sprayed with 0.3 per cent solution of Mg, Zn, Bo and Mn applied in single or in different concentrations. The highest yield 26.1 kg/tree and the best fruit quality were obtained with Mg + Zn + Bo.

Kumar et al. (1988) observed the sprayed of lower concentration of ZnSO₄ on grape to significantly improved the berry set, size and length of bunch, T.S.S. and fruit juice.

Pandey et al. (1988) reported on foliar sprayed with micro-nutrient on Sardar guava to significantly increased the fruit size, weight, yield and quality.

Sharma and Bhattacharya (1989) reported that leaf N and K concentration increased significantly effected with foliar application of Zn on guava cv. Allahabad Safeda and Banarasi.

Pandey et al. (1989) reported that spraying of urea and ZnSO₄ on guava cv. Sardar results in early ripening by 10 days.

Wahid et al. (1991) reported on guava cv. Allahabad Safeda that sprayed with 2 per cent urea, 1 per cent K₂SO₄, 0.4 per cent ZnSO₄, 0.2 per cent Borex, 2 per cent urea + 1 per cent K₂SO₄, 2 per cent urea + 0.4 per cent ZnSO₄ or 2 per cent urea + 0.2 per cent Borax before flowering, at fruit setting and 3 weeks after fruit setting. The treatment had no significant effect on yield but significantly increased fruit weight (84.6 gm.) and breath (5.43 cm.) were obtained with 2 per cent urea and also resulted the highest yield (21.83 kg) per plant. All treatment improved the highest T.S.S. (11.83%) and total sugar (8.71%) and acidity (0.97%) due to 1 per cent K₂SO₄.
Bambal *et al.* (1991) reported that foliar sprayed of micro-nutrients on pomegranate cv. Ganesh, Mn and Zn increased the yield and reduced the fruit cracking and combination of Fe + Zn increased the highest number of fruits.

Desai *et al.* (1991) studied on the effect of foliar sprayed of micro-nutrients on Mosambi (sweet orange) significantly increased the fruit size, T.S.S., Vitamin C, acidity and fruit juice with Zn, Mn, Mg and Fe are used.

Shadhu *et al.* (1993) reported that application of 0.4 per cent foliar sprayed and 500 g. of Zinc sulphate in soil application to improved the fruit juice, T.S.S., acidity in the Patharnakh pear.

Bramchari *et al.* (1997) reported that the foliar feeding of 1.5 per cent calcium and potassium chloride showed 66.92 per cent fruit set and 39.12 kg fruit yield per plant in guava cv. Allahabad Safeda in rainy season.

### 2.3 Fruit Quality:

Arora and Singh (1970) that 2 per cent foliar application of urea reduced the acidity content and increased the sugar, T.S.S. content and weight of guava fruits.

Singh and Rajput (1977) also advocated that 4 per cent foliar application of urea in guava increased the quality of fruits but it was found to be reduced at 6 per cent foliar application.

Singh and Rajput (1977) reported that N application had highly significantly effect on most of fruit characters. The spraying of 4 per cent urea increase the T.S.S., reducing sugar, total sugar and pectin content. They further noted that acidity content of fruit was not found to be reduced significantly with spraying of urea.
Singh (1985) observed that spraying of 2 per cent urea, 1 per cent \( \text{K}_2\text{SO}_4 \) and 2 per cent urea + 1 per cent \( \text{K}_2\text{SO}_4 \) (before flowering at fruit setting and 3 weeks after setting) on cv. Allahabad Safeda increased fruit weight (84.67 g.) and breath (5.43 cm.). However, 2 per cent urea treatment produced the highest fruit yield (21.83 kg/plant).

Singh (1975) revealed that foliar spray of nitrogen and phosphorus at 2 and 4 per cent were found more effective in increasing the ascorbic acid and reduced the acidity of fruit of Mango cv. Langra.

Lodh and Rasid (1980) reported that 10 years old kinnow mandrin applied with 2 lb urea per tree increased T.S.S. and total sugar and lowered the acidity.

Ahlawat and Yamdagni (1981) observed that 1 per cent solution of potassium sulphate sprayed 7 days after fruit set and six more time at weekly intervals produced significantly improved quality of fruits particularly the content of T.S.S. and total sugar. They also reported that acidity and vitamin C content were not effected by foliar spray of 1 per cent in guava.

Singh and Rajput (1981) conducted trail on effect of foliar application of 2, 4 and 6 per cent of urea on 18 years old guava cv. Allahabad Safeda and observed that better quality of fruits of guava.

Singh (1982) reported that good quality of fruits with the application of urea at 4 or 6 per cent in the month of January and July in guava.

Singh et al. (1983) reported on guava the effect of foliar spray of urea and boric acid at 2 - 3 per cent and 0.1 - 0.3 per cent were applied and found to the largest fruit (125.8 g.) the best quality (14.4 per cent) T.S.S.
and 8.2 per cent total sugars were produced with 3 per cent urea + 0.3 per cent boric acid.

Singh and Singh (1984) observed that spraying Mg at 0.1, 0.2, 0.3 and 0.4 per cent of guava cv. Allahabad Safeda in both season crops respectively 0.3 per cent was best fruit quality to be produced.

Joon et al. (1984) studied on Ber with urea and zinc sulphate sprayed on physico-chemical composition of fruits. Significantly effect the fruit quality with 2 per cent nitrogen + 0.8 per cent zinc sulphate in comparision to other treatments.

Singh (1985) observed on guava that foliar application of 4 or 6 per cent urea in January and July for 2 years increased the fruit quality as T.S.S., sugr, ascorbic acid, reducing sugar acidity and pectin contents.

Khera et al. (1985) reported that good quality of fruits was obtained from trees receiving soil applied zinc in 13 years old orange tree.

Ghosh (1986) reported that on guava cv. L-49 trees sprayed with 0.3 per cent solution of Zn, Mg, Bo and Mn were applied in single or different concentrations. The best quality produced with Mg + Zn + Bo.

Kumar et al. (1988) observed the sprayed of lower concentration of ZnSO₄ on grape plant to improved significantly good quality of T.S.S. and fruit juice.

Wahid et al. (1991) reported guava sprayed with 2 per cent urea, 1 per cent K₂SO₄, 0.4 per cent ZnSO₄, 0.2 per cent borex, 2 per cent urea + 1 per cent K₂SO₄, 2 per cent urea + 0.4 per cent ZnSO₄ or 2 per cent urea + 0.2 per cent borex before flowering and after fruit setting. All treatment improved the highest T.S.S. (11.8%), total sugar (8.7%), acidity (0.97%) due to 1 per cent K₂SO₄.
Sharma et al. (1991) reported on guava cv. Allahabad Safeda were found with 0.6 per cent ZnSO₄ increased T.S.S. and vitamin C.

Singh et al. (1991) reported that the mango cv. Amrapali to obtained increased T.S.S., ascorbic acid, reducing sugar, total sugar with 5 per cent urea sprayed.

Desai et al. (1991) studied the effect of foliar sprayed with micro-nutrient on Mosambi (Sweet orange) significantly increased the T.S.S., vitamin C, acidity and fruit juice with Zn, Mn and Fe were used.

Benwal et al. (1992) reported the sprayed of 0.5 per cent urea + 1.0 per cent potassium sulphate significantly increased the T.S.S. and reducing sugar in grapes cv. Per let.

Sadhu et al. (1993) reported that spraying with 0.4 per cent and 500 g. of ZnSO₄ in soil application to improved the fruit juice, T.S.S. and ascorbic acid in Phatharmakh pear fruits.

Brahmchari et al. (1997) reported that the foliar feeding of 1.5 per cent calcium and potassium chloride to obtained good quality of fruits guava cv. Allahabad Safeda.

**Basal Application:**

Sinha et al. (1961) reported that medium and low level of N doses (454 g. and 227 g. per tree per year) were found appropriate to bearing tree of 12 years old guava for better fruit quality. The increased doses of N (681 g. per tree) deteriorated the quality of fruits. They also reported that application of N upto 454 g. per tree produced fruits of light yellow colour but the doses increased to 681 g. per tree produced fruit of green colour.

Shankar et al. (1966) reported that 9.3 per cent total sugar in Cv. Sardar (L-49).
Tiwari et al. (1966) reported that N application increased the size and weight of guava fruits. They also noted the nitrogen and potash when applied separately increased the weight of fruits.

Teaotia et al. (1969) reported that total sugar content varied from 8.46 to 9.58 per cent in mature fruits of guava. They also reported that cv. L-49 (Sardar) have 0.5 per cent acidity and 0.06 to 11.5 per cent total sugar under Eastern U.P.

Rathore (1976) found that the fruit of guava of winter season had more sugar, T.S.S. and titrable acidity as compared to rainy season fruits while moisture content was higher in rainy season guava. The titrable acidity was 0.18 per cent, 0.33 per cent total sugar was 6.17 per cent, 9.2 per cent in rainy and winter guava cv. Sardar, respectively.

Kumar and Honda (1977) reported that fruits of winter season were more superior than rainy season guava having acidity 0.38 per cent and vitamin C 339.6 mg/100 g. fruit at full mature stage.

Chundawat et al. (1976) reported that fruits of guava cv. Sardar (L-49) were bigger in size (length - 720 cm., width 6.5 cm.) in rainy as compared to winter season (length 13 cm, width 5.73 cm.). They also reported that fruits from winter season crops were richer T.S.S. (134°B) reducing sugar (2.10 per cent), non reducing sugar (4.45 per cent), acidity (0.523 per cent) and vitamin C (346.20 mg/100 gm) content as compared to rainy season guava cv. Sardar (L-49).

Sikhamani et al. (1978) found that nitrogen application increased the yield of guava in rainy season by augmenting fruit weight.

Chauhan et al. (1986) reported the higher level of protein (1.21%), total sugar (11.0%) ascorbic acid (326 mg/100 g) and T.S.S.
(15.2°B) in winter season fruits as compared to rainy season but acidity was lower (0.37%) as compared to rainy season (0.38%) fruit in guava cv. L-49.

**Tossar Koj et al. (1989)** advocated that the best quality fruits having highest level of ascorbic acid and total sugar content were obtained with the application of 400 g. N per tree per year in rainy season, whereas, in winter season, highest T.S.S. and acidity were recorded with soil application of 600 g. N per tree per year in guava cv. Sardar (L-49).

**Tomar et al. (1998)** revealed that N and K application increased the T.S.S., reducing sugars, acidity and pulp seed ratio. N rate had no significant effect on total sugar content.

**Kumar et al. (1996)** observed that nitrogen doses from 100 g. to 800 g. per tree per year did not show significant effect on individual fruit weight in guava cv. Allahabad Safeda. Highest T.S.S. (11.92°B) and lower acidity (0.20%) ascorbic acid (180 mg/100 g.) and reducing sugar (5.30%) were noted with 800 g. N per tree per year. They conducted that increasing level of N significantly increased T.S.S., ascorbic acid and reducing sugar but reduced acidity of juice as compared to control.

**Ram et al. (1999)** advocated that fruit quality was improved with application of slow releasing fertilizer as well as urea. T.S.S. 14.8°B, 4.5% reducing sugar and 339.9 mg/100 g. ascorbic acid was observed with 600 g. neem coated urea. Ascorbic acid 326.7 mg/100 g. fruit was observed with 600 g. urea/plant/year. They also reported the maximum diameter (5.9 cm.), length (6.4 cm.) and weight of individual fruit (212 g.) with 600 g. urea/plant/year in second year crop of guava.

### 2.4 P.G.R. + Macro + Macro-nutrients:

**Bagde and Kandolkar (1981)** observed that application of growth regulators on guava trees to significantly improved the fruit quality and yield.
Singh and Rajput (1986) reported to guava cv. Allahabad Safeda trees sprayed with calcium nitrate 1 or 2 per cent, NAA 50 or 100 ppm and GA at 20 - 40 ppm were applied alone or different combinations in last week of February again in IInd week of March (for March April flush) or last week of June and again IInd week of July (for July - August flush). Maximum shoot growth in both cases was obtained with 2% calcium nitrate + 40 ppm GA. However, the best result overall obtained in both crops with 2 per cent calcium + 100 ppm NAA.

Singh and Singh (1988) reported on guava cv. Allahabad Safeda in two year trails, calcium nitrate at 1 or 2 per cent, NAA at 50 - 100 ppm and GA3 20 - 40 ppm were applied alone or in different combinations. The treatment were applied at 4 different stages viz., emergence of new shoot, opening of some flower buds, fruit setting and 15 days before harvesting. The combination of 2 per cent calcium nitrate + 100 pm NAA had best effect on fruit quality.

Kumar et al. (1988) reported the effect of foliar sprayed with PGR and urea on Lomon crop to produced good crop of summer and Autumn flush.

Sharma and Dhillon (1989) reported on the effect of zinc sulphate and plant growth regulation on fruit of litchi (Litchi chinensis) to obtained the maximum fruit volume length and diameter and the minimum seed size with these treatments.