The Pharma Innovation Journal 2022; 11(10): 1530-1535

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(10): 1530-1535

www.thepharmajournal.com
Received: 22-08-2022
Accepted: 24-09-2022

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Influence of different dosage and frequency of liquid jeevamrutha application on leaf nutrient status of guava (*Psidium guajava*) cv. L-49 under Northern Transition Zone of Karnataka

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DOI: https://doi.org/10.22271/tpi.2022.v11.i10r.16292

Abstract
The present field experiment was conducted at Regional Horticultural Research and Extension Center, Kumbapur, Dharwad during 2019-20 and 2020-2021. The objective of the study was to study the influence of application of liquid jeevamrutha at different dosage and frequency on leaf nutrient status (N, P, K, Ca, Mg & S) of guava cv. L-49. The experiment was designed in two factorial randomized block design with each factor having three levels. Three different levels of liquid jeevamrutha *viz.*, 500 l/ha, 750 l/ha and 1000 l/ha at different frequencies like 15 days, 21 days and 30 days was applied to guava trees in the effective root zone area. The combination effect of dosage and frequency of application was compared with recommended package of practice (RPP). The results showed that application of higher dosage of liquid jeevamrutha *i.e.*, 1000 l/ha at an interval of 15 days recorded significantly higher leaf nutrient status. Similarly in interactions also D_3F_1 (Application of liquid jeevamrutha @ 1000 l/ha at 15 days interval) recorded significantly highest nitrogen (1.79 % and 1.56 %), phosphorous (0.30 % and 0.23 %), potassium (0.73 and 0.68 %), Sulphur (0.54 % and 0.49 %), calcium (2.30 % and 2.09 %) and magnesium (0.68 % and 0.50 %) at flowering and after harvest respectively.

Keywords: Guava, Liquid jeevamrutha, Leaf nutrients, Nitrogen

Introduction
Guava (*Psidium guajava* L.) also known as “apple of the tropics” and “poor man’s apple”, is the most important, highly productive, delicious and nutritious fruit grown commercially throughout the tropical and subtropical regions of India. It occupies a pride place amongst the important fruits grown in the country and claims to be the fourth most important fruit crop in area and production after mango, banana and citrus. In India, guava is cultivated in an area of 265 thousand hectare with an annual production of 4054 thousand tones and productivity of 15.3 MT per hectare. In Karnataka, guava is cultivated in an area of 7.18 thousand hectares with an annual production of 140.23 thousand MT with a productivity of 19.52 MT per hectare (Anon, 2018) [1]. Indiscriminate use of chemical fertilizers and pesticides destroys the beneficial soil micro flora and fauna that pollute soil and ground water. Further, in the near future, we may face severe problems in the fertilizer production as the reserves of some fertilizer components, especially phosphates are becoming limiting. Hence, there is an urgent need to tap the alternate sources for these nutrients, which has to be eco-friendly, low cost, locally adoptable, simple and sustainable. Hence, keeping these views in mind is the need of the hour and it needs to be ascertained that the quantum of inorganic fertilizers that could substituted with natural farming preparations and practices (liquid jeevamrutha, ghanajeevamrutha and mulching) and organic farming (FYM, poultry manures, Neem based products, bio fertilizers, Panchagavya etc.) practices without sacrificing the yield and deterioration in the fruit quality. In this regard present experiment entitled “Influence of different dosage and frequency of liquid jeevamrutha application on leaf nutrient status of guava (*Psidium guajava*) cv. L-49 under Northern Transition Zone of Karnataka” was carried out with an objective to know the influence of application of liquid jeevamrutha at different dosage and frequency on leaf nutrient status (N, P, K, Ca, Mg & S) of guava cv. L-49.

Material and Methods

The present field experiment was conducted at Regional horticulture research and extension center, Kumbapur, Dharwad during 2019-2020 and 2020-2021. Dharwad comes under Northern Transitional Zone (Zone 8) of Karnataka, which lies between the Western heavy rainfall areas of Hilly Zone (Zone 9) and low rainfall areas of planes of Northern Dry Zone (Zone 3) of Karnataka with average rainfall of 870 mm. The experiment was laid out in the factorial randomized design (FRBD) with two factors each having three levels. There are totally 12 treatments which were replicated thrice. Factor I- Dosage of liquid jeevamrutha (D) includes three levels *i.e.*, D_1 (500 litre/ha), D_2 (750 liter/ha) and D_3 (1000 litre/ha) and Factor II- Frequency of application (F) includes three levels *i.e.*, F_1 (application of liquid jeevamrutha once in 15 days), F_2 (application of liquid jeevamrutha once in 21 days) and F_1 (application of liquid jeevamrutha once in 30 days). These combinations were compared with Control treatment *i.*e., RPP (N:P:K @ 300:120:150 g per tree + FYM @ 25 kg per tree). In order to check the individual effect of liquid jeevamrutha and ghanajeevamrutha, combination treatments were compared with RPP, only jeevamrutha application and only ghanajeevamrutha application and the treatment details are furnished in table 1. The leaf sampling for nutrient analysis was done at flowering stage and after fruit harvest stage. The index used for nutrient analysis in guava is leaves *i.e.*, third pair of leaves from the end of the branch. Leaf samples were collected from each treatment at the time of flowering and after harvest. About 30 leaves per tree were taken from different branches in all the four directions of the tree in order to obtain uniform representative leaf sample. The sampling was done between 8-10 am to reduce variation. These samples were brought to laboratory and washed with dilute detergent (0.2%) and acid (0.1 N HCL) to remove dust and contaminants finally washed with distilled water and oven dried and grinded into fine powder by using mixer. Further used for estimation of N, P, K, Ca, Mg and S content. Nitrogen content in leaf was determined by Kjeldhal distillation method, the phosphorous content in the digested plant samples was determined by vanado molybdo phosphoric yellow colour method. The intensity of yellow colour developed was determined by using spectrophotometer at 420 nm wave length (Piper, 1966) [6]. Plant samples were digested by using di-acid mixture. Potassium content in the digested samples was determined by using flame photometer method (Piper, 1966) [6]. The Ca and Mg in the di-acid digested samples were estimated by complex metric titration method involving standard EDTA (Jackson, 1973) [4]. Calcium and magnesium (Ca + Mg) was determined at 10.0 pH (using buffer complex) in presence of EBT indicator while, calcium alone was estimated at 12.0 pH (using NaOH solution) in presence of Patons and Reader indicator reagent. Sulphur in the di-acid digested samples were determined by developing turbidity using $BaCl_2$) crystals. The intensity of turbidity developed was measured at 420 nm using spectrophotometer and estimated by referring S- standard curve (Piper, 1966) [6].

Table 1: Treatment details and combinations (D × F)

T_1	D_1F_1	Application of liquid jeevamrutha @ 500 litre/ha once in two weeks
T_2	D_1F_2	Application of liquid jeevamrutha @ 500 litre/ha once in three weeks
T_3	D_1F_3	Application of liquid jeevamrutha @ 500 litre/ha once in four weeks
T_4	D_2F_1	Application of liquid jeevamrutha @ 750 litre/ha once in two weeks
T_5	D_2F_2	Application of liquid jeevamrutha @ 750 litre/ha once in three weeks
T_6	D_2F_3	Application of liquid jeevamrutha @ 750 litre/ha once in four weeks
T_7	D_3F_1	Application of liquid jeevamrutha @ 1000 litre/ha once in two weeks
T_8	D_3F_2	Application of liquid jeevamrutha @ 1000 litre/ha once in three weeks
T_9	D_3F_3	Application of liquid jeevamrutha @ 1000 litre/ha once in four weeks
T_{10}	-	Application of liquid jeevamrutha @ 500 litre/ha once in three weeks
T_{11}	-	Application of ghanajeevamrutha @ 1000 kg/ha at the beginning of the season
T_{12}	RPP	Recommended Package of Practice (N:P:K @ 300:120:150 g per tree+ FYM @ 25 kg per tree)

Note: * Organic mulching was common to all the treatments except T_{12}

* Ghanajeevamrutha @ 1000 kg per hectare applied common to all the treatments from T_1 to T_9

Results and Discussion

Leaf nitrogen content (%)

Different dosage of jeevamrutha application influenced the leaf nitrogen content significantly at both flowering and after harvest during 2019-2020, 2020-2021 and also in pooled data. In pooled data, significantly the highest leaf nitrogen content was recorded with the application of jeevamrutha @ 1000 litre per hectare (D_3) (1.64 % and 1.35 % at flowering and after harvest, respectively) among dosage, F_1 (15 days interval) among frequencies (1.66 % and 1.4 1 % at flowering and after harvest, respectively) and D_3F_1 (Liquid jeevamrutha @ 1000 l/ha at an interval of 15 days) among interactions (1.79 % and 1.56 % at flowering and after harvest respectively) significantly the lowest leaf nitrogen content was recorded in D_1, F_3 and D_1F_3 (Table 2).

Leaf phosphorous content (%)

In pooled data, significantly the highest leaf phosphorous content was recorded with application of jeevamrutha @ 1000 litre per hectare (D_3) (0.23 % and 0.17 % at flowering and after harvest, respectively), F_1 (0.24% and 0.19 %) and significantly the lowest leaf phosphorous content was recorded in F_3 (0.18 % and 0.12 %) at flowering and after harvest respectively. Among the interactions, in pooled data, significantly the highest phosphorous content in leaf was recorded with application of jeevamrutha @ 1000 litre per hectare at an interval of 15 days (D_3F_1) (0.30 % and 0.23 % at flowering and after harvest, respectively).

Table 2: Nitrogen and phosphorous content (%) in leaves of guava *cv.* L-49 as influenced by different dosage and frequency of liquid jeevamrutha

Treatment	Leaf nitrogen (%)						Leaf phosphorous (%)					
	At flowering			After harvest			At flowering			After harvest		
	2019-20	2020-21	Pooled	2019-20	2020-2021	Pooled	2019-20	2020-21	Pooled	2019-20	2020-2021	Pooled
Dosage												
D_1	1.45^{c}	1.47^{c}	1.46^{c}	1.16^{c}	1.20^{b}	1.18^{c}	0.16^{b}	0.17^{b}	0.17^{b}	0.13^{b}	0.14^{b}	0.13^{b}
D_2	1.53^{b}	1.56^{b}	1.54^{b}	1.26^{b}	1.32^{a}	1.29^{b}	0.20^{a}	0.24^{b}	0.22^{a}	0.15^{a}	0.17^{a}	0.16^{a}
D_3	1.64^{a}	1.65^{a}	1.64^{a}	1.34^{a}	1.36^{a}	1.35^{a}	0.21^{a}	0.25^{a}	0.23^{a}	0.16^{a}	0.18^{a}	0.17^{a}
S.E.M±	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
C.D. @ 5 %	0.07	0.05	0.05	0.04	0.05	0.04	0.02	0.03	0.02	0.02	0.02	0.02
Frequency												
F_1	1.65^{a}	1.68^{a}	1.66^{a}	1.38^{a}	1.43^{a}	1.41^{a}	0.23^{a}	0.26^{a}	0.24^{a}	0.19^{a}	0.20^{a}	0.19^{a}
F_2	1.53^{b}	1.55^{b}	1.54^{b}	1.22^{b}	1.25^{b}	1.24^{b}	0.19^{b}	0.21^{b}	0.20^{b}	0.14^{b}	0.15^{b}	0.15^{b}
F_3	1.44^{c}	1.43^{c}	1.44^{c}	1.16^{c}	1.20^{c}	1.18^{c}	0.16^{c}	0.19^{b}	0.18^{b}	0.11^{c}	0.14^{b}	0.12^{c}
S.E.M±	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
C.D. @ 5 %	0.07	0.05	0.05	0.04	0.05	0.04	0.02	0.03	0.02	0.02	0.02	0.02
Interaction												
D_1F_1	1.54^{bc}	1.57^{bc}	1.56^{cd}	1.27^{bc}	1.31^{cd}	1.29^{cd}	0.18^{cd}	0.19^{cd}	0.19^{de}	0.16^{cd}	0.16^{cde}	0.16^{c}
D_1F_2	1.42^{cd}	1.43^{de}	1.43^{ef}	1.11^{e}	1.16^{fg}	1.14^{fg}	0.17^{cd}	0.16^{d}	0.17^{cd}	0.13^{ef}	0.13^{de}	0.13^{de}
D_1F_3	1.38^{d}	1.41^{e}	1.39^{f}	1.10^{e}	1.13^{g}	1.11^{g}	0.14^{d}	0.17^{d}	0.15^{f}	0.11^{f}	0.12^{ef}	0.12^{e}
D_2F_1	1.63^{b}	1.66^{b}	1.64^{b}	1.33^{b}	1.41^{b}	1.37^{b}	0.24^{ab}	0.26^{ab}	0.25^{b}	0.18^{b}	0.20^{b}	0.19^{b}
D_2F_2	1.56^{b}	1.59^{b}	1.58^{bcd}	1.31^{bc}	1.34^{bc}	1.32^{bc}	0.20^{bc}	0.24^{bc}	0.22^{e}	0.16b^{c}	0.17^{bc}	0.17^{c}
D_2F_3	1.40^{d}	1.42^{de}	1.41^{d}	1.15^{de}	1.21^{ef}	1.18^{ef}	0.18c^{d}	0.23^{bc}	0.20^{cd}	0.11^{f}	0.14^{ce}	0.13^{e}
D_3F_1	1.77^{a}	1.81^{a}	1.79^{a}	1.54^{a}	1.57^{a}	1.56^{a}	0.28a	0.31^{a}	0.30^{a}	0.22^{a}	0.24^{a}	0.23^{a}
D_3F_2	1.61^{b}	1.64^{b}	1.63^{bc}	1.24^{de}	1.26^{de}	1.25^{d}	0.20^{bc}	0.24^{b}	0.22^{bc}	0.14^{ef}	0.16^{cd}	0.15^{cd}
D_3F_3	1.53^{bc}	1.48^{cd}	1.51^{de}	1.23^{cd}	1.25^{de}	1.24^{de}	0.16^{cd}	0.19^{cd}	0.18^{def}	0.12^{f}	0.15^{cde}	0.13^{de}
S.E.M±	0.04	0.03	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01
C.D. @ 5 %	0.12	0.09	0.09	0.08	0.09	0.06	0.04	0.03	0.04	0.03	0.04	0.03
J	1.37	1.40	1.38	1.03	1.10	1.07	0.14	0.16	0.15	0.10	0.12	0.11
GJ	1.29	1.31	1.30	0.98	1.07	1.03	0.13	0.14	0.14	0.08	0.10	0.09
RPP	1.61	1.65	1.63	1.24	1.27	1.27	0.19	0.24	0.22	0.16	0.17	0.17
S.E.M±	0.04	0.07	0.05	0.03	0.06	0.03	0.01	0.02	0.01	0.01	0.01	0.01
C.D. @ 5 %	0.12	0.22	0.13	0.08	0.17	0.09	0.04	0.04	0.04	0.03	0.03	0.03

Note: D_1- Application of jeevamrutha @ 500 l/ha (2.8 l /tree)
D_2 -Application of jeevamrutha @ 750 l/ha (4.2 l /tree)
D_3- Application of jeevamrutha @ 1000 l/ha (5.6 l /tree)
F_1- Application of jeevamrutha once in 15 days
F_2- Application of jeevamrutha once in 21 day
F_3- Application of jeevamrutha once in 30 days
J - Only jeevamrutha @ 500 l/ha (2.8 l /tree) once in 21 days
G- Only ghanajeevamrutha @ 1000 kg/ha (5.6 kg/tree)
RPP- Recommended package of practice (NPK @ 300:120:150 g/tree + FYM @ 25 kg/tree)

Significantly the lowest leaf phosphorous content was recorded in D_1F_3 (0.15% and 0.12% at flowering and after harvest, respectively) (Table 2).

Leaf potassium (%)

In pooled data, significantly the highest leaf potassium content was recorded with application of jeevamrutha @ 1000 litre per hectare (D_3) (0.67 % and 0.58 %) which was on par with D_2 (0.62 % and 0.51 %) and significantly the lowest leaf potassium content was recorded in D_1 (0.50 % and 0.39 %) at flowering and after harvest, respectively. Among different frequencies significantly the highest potassium content in leaf was recorded with application of jeevamrutha at 15 days interval (F_1) (0.68 % and 0.59 % during flowering and after harvest respectively) which was on par with F_2 (0.60 % during flowering) and significantly the lowest was recorded in F_3 (0.52 % and 0.39 % at flowering and after harvest, respectively). Among interaction treatments, the pooled data showed that, significantly the highest potassium content in leaf was recorded when jeevamrutha was applied @ 1000 litre per hectare at an interval of 15 days (D_3 F_1) (0.73% and 0.68 % at flowering and after harvest respectively) which was on par with D_2 F_1 (0.71 % and 0.63 % at flowering and after harvest, respectively) and D_3 F_2 (0.69 % and 0.61 % at flowering and after harvest, respectively). Significantly the lowest leaf potassium content was recorded in D_1 F_3 (0.43 % and 0.36 % at flowering and after harvest, respectively), (Table 3).

Table 3: Potassium and Sulphur content (%) in leaves of guava *cv.* L-49 as influenced by different dosage and frequency of liquid jeevamrutha

Treatment	Leaf potassium (%)						Leaf Sulphur (%)					
	At flowering			After harvest			At flowering			After harvest		
	2019-20	2020-21	Pooled	2019-20	2020-21	Pooled	2019-20	2020-21	Pooled	2019-20	2020-21	Pooled
Dosage												
D_1	0.48^{b}	0.52^{b}	0.50^{b}	0.37^{c}	0.41^{b}	0.39^{b}	0.27^{b}	0.34^{b}	0.31^{b}	0.25^{b}	0.29^{b}	0.27^{b}
D_2	0.61^{a}	0.64^{a}	0.62^{a}	0.48^{b}	0.53^{a}	0.51^{a}	0.36^{a}	0.42^{a}	0.39^{a}	0.31^{ab}	0.34^{ab}	0.33^{ab}
D_3	0.66^{a}	0.69^{a}	0.67^{a}	0.55^{a}	0.60^{a}	0.58^{a}	0.40^{a}	0.46^{a}	0.43^{a}	0.36^{a}	0.40^{a}	0.38^{a}
S.E.M±	0.03	0.03	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02
C.D. @ 5%	0.10	0.09	0.09	0.06	0.09	0.07	0.05	0.06	0.06	0.06	0.06	0.06
Frequency												
F_1	0.66^{a}	0.70^{a}	0.68^{a}	0.56^{a}	0.61^{a}	0.59^{a}	0.42^{a}	0.49^{a}	0.45^{b}	0.38^{a}	0.42^{a}	0.40^{a}
F_2	0.58^{ab}	0.61^{ab}	0.60^{ab}	0.47^{b}	0.52^{a}	0.50^{b}	0.34^{b}	0.41^{b}	0.37^{d}	0.30^{b}	0.34^{b}	0.32^{b}
F_3	0.50^{b}	0.53^{b}	0.52^{b}	0.37^{c}	0.41^{b}	0.39^{c}	0.27^{c}	0.33^{c}	0.30^{c}	0.24^{b}	0.27^{c}	0.25^{c}
S.E.M±	0.03	0.03	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02
C.D. @ 5 %	0.10	0.09	0.09	0.06	0.09	0.07	0.05	0.06	0.06	0.06	0.06	0.06
Interaction												
D_1F_1	0.58^{a-d}	0.62^{abc}	0.60^{cd}	0.43^{cd}	0.48^{cd}	0.45^{cd}	0.32^{cde}	0.38^{cde}	0.35^{cde}	0.28^{bc}	0.35^{bcd}	0.32^{bc}
D_1F_2	0.45^{cd}	0.49^{cd}	0.47^{d}	0.35^{d}	0.39^{d}	0.37^{d}	0.27^{de}	0.34^{de}	0.31^{de}	0.24^{c}	0.28^{de}	0.26^{c}
D_1F_3	0.41^{d}	0.45^{d}	0.43^{d}	0.33^{d}	0.36^{d}	0.35^{d}	0.23^{e}	0.31^{e}	0.27^{e}	0.23^{c}	0.24^{e}	0.23^{c}
D_2F_1	0.69^{a}	0.72^{a}	0.71^{a}	0.61^{a}	0.65^{ab}	0.63^{a}	0.42^{ab}	0.51^{ab}	0.46^{ab}	0.38^{b}	0.41^{ab}	0.39^{ab}
D_2F_2	0.63^{ab}	0.64^{ab}	0.64^{bc}	0.49^{bc}	0.54b^{c}	0.52^{bc}	0.36^{bcd}	0.42^{bcd}	0.39^{bcd}	0.31^{bc}	0.34^{bcde}	0.32^{bc}
D_2F_3	0.51^{bcd}	0.54^{bcd}	0.53^{d}	0.35^{d}	0.41^{cd}	0.38^{d}	0.29^{de}	0.32^{de}	0.31^{de}	0.25^{c}	0.27^{de}	0.26^{c}
D_3F_1	0.71^{a}	0.75^{a}	0.73^{a}	0.64^{a}	0.71^{a}	0.68^{a}	0.51^{a}	0.58^{a}	0.54^{a}	0.48^{a}	0.50^{a}	0.49^{a}
D_3F_2	0.66^{ab}	0.71^{a}	0.69^{ab}	0.58^{ab}	0.64^{ab}	0.61^{ab}	0.40^{bc}	0.46^{bc}	0.43^{bc}	0.37^{b}	0.39b^{c}	0.38^{b}
D_3F_3	0.59^{abc}	0.61^{abc}	0.60^{cd}	0.42^{cd}	0.46^{cd}	0.44^{cd}	0.29^{de}	0.35^{de}	0.32^{de}	0.24^{c}	0.29^{cde}	0.27^{c}
S.E.M±	0.06	0.05	0.05	0.04	0.05	0.04	0.03	0.04	0.03	0.03	0.04	0.03
C.D. @ 5 %	0.17	0.15	0.16	0.11	0.14	0.12	0.09	0.11	0.10	0.10	0.11	0.10
J	0.40	0.43	0.42	0.32	0.35	0.34	0.26	0.29	0.27	0.21	0.23	0.22
GJ	0.38	0.38	0.38	0.28	0.31	0.30	0.22	0.25	0.24	0.18	0.20	0.19
RPP	0.61	0.66	0.64	0.56	0.58	0.57	0.34	0.39	0.36	0.30	0.34	0.32
S.E.M±	0.06	0.05	0.05	0.04	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03
C.D. @ 5 %	0.17	0.13	0.15	0.11	0.15	0.11	0.08	0.10	0.09	0.09	0.10	0.08

Note: D_1- Application of jeevamrutha @ 500 l/ha (2.8 l /tree)
D_2 -Application of jeevamrutha @ 750 l/ha (4.2 l /tree)
D_3- Application of jeevamrutha @ 1000 l/ha (5.6 l /tree)
F_1- Application of jeevamrutha once in 15 days
F_2- Application of jeevamrutha once in 21 day
F_3- Application of jeevamrutha once in 30 days
J - Only jeevamrutha @ 500 l/ha (2.8 l /tree) once in 21 days
G- Only ghanajeevamrutha @ 1000 kg/ha (5.6 kg/tree)
RPP- Recommended package of practice (NPK @ 300:120:150 g/tree + FYM @ 25 kg/tree)

Leaf Sulphur content (%)

Different dosage of jeevamrutha application influenced the leaf nitrogen content significantly at both flowering and after harvest during 2019-2020, 2020-2021 and also in pooled data. In pooled data, significantly the highest leaf Sulphur content was recorded with the application of jeevamrutha @ 1000 litre per hectare (D_3), (0.43 % and 0.38 % at flowering and after harvest, respectively) among dosage, F_1 (15 days interval) among frequencies (0.45 % and 0.40 % at flowering and after harvest, respectively) and D_3F_1 (Liquid jeevamrutha @ 1000 l/ha at an interval of 15 days) among interactions (0.54 % and 0.49 % at flowering and after harvest respectively) significantly the lowest leaf Sulphur content was recorded in D_1, F_3 and D_1F_3 (Table 3).

Leaf calcium content (%)

Pooled data of the two years revealed that, significantly the highest leaf calcium content was recorded with the application of jeevamrutha @ 1000 litre per hectare (D_3) (1.87 % and 1.73 % at flowering and after harvest, respectively) among dosage, F_1 (15 days interval) among frequencies (1.94 % and 1.79 % at flowering and after harvest, respectively) and D_3F_1 (Liquid jeevamrutha @ 1000 l/ha at an interval of 15 days) among interactions (2.30 % and 2.09 % at flowering and after harvest respectively) significantly the lowest leaf nitrogen content was recorded in D_1, F_3 and D_1F_3 (Table 4).

Leaf magnesium content (%)

Different dosage of jeevamrutha application influenced the leaf nitrogen content significantly at both flowering and after harvest during 2019-2020, 2020-2021 and also in pooled data. In pooled data, significantly the highest leaf nitrogen content was recorded with the application of jeevamrutha @ 1000 litre per hectare (D_3), (0.59 % and 0.39 % at flowering and after harvest, respectively) among dosage, F_1 (15 days interval) among frequencies (0.62 % and 0.41 % at flowering and after harvest, respectively) and D_3F_1 (Liquid jeevamrutha @ 1000 l/ha at an interval of 15 days) among interactions (0.68 % and 0.50 % at flowering and after harvest respectively) significantly the lowest leaf nitrogen content was recorded in D_1, F_3 and D_1F_3 (Table 4).

Discussion

The increase in the leaf nutrient concentration with the

application of higher dosages of liquid jeevamrutha and ghanajeevamrutha can be related to their ability to trigger the soil biological activities *i.e.*, microbial and enzyme activities which helps in conversion of non-available form of nutrients to available form thereby increasing the available nutrients in soil which on successful absorption by the plants resulted in accumulation of nutrients in leaves. The results are in conformity with the findings of Gore and Sreenivasa (2011) [3] where in, the nutrient concentrations *viz*., N, P and K in tomato plants were significantly higher with the application of RDF + Beejamruth + Jeevamrutha + Panchagavya. Kumar (2016) [5] reported that application of jeevamrutha at 2000 liters ha^{-1} with Panchagavya at 6 per cent recorded higher pod nitrogen, phosphorus and potassium content in French bean.

The highest leaf nutrient status was recorded at the time of flowering and retention of leaf nutrients after harvest was due to application of jeevamrutha @1000 litre per hectare with an interval of 15 days. Continuous application of jeevamrutha increase soil biological activity and it adds nutrients to the soil by decomposition of organic matter. This might have helped in greater availability of nutrients in the rhizospheric soil which has enhanced the uptake of nutrients by the tree. The results are in conformity with the findings of Gore and Sreenivasa, (2011) [3] and Sutar *et al.* (2017) [8] and they reported that, significantly the highest uptake of nitrogen, phosphorus and potassium was recorded with the application of jeevamrutha @ 1000 litre per hectare and these findings are in accordance with Gangadhar *et al.* (2020) [2] who reported that highest nitrogen, phosphorous and potassium content was recorded with jeevamrutha application as compared to application of microbial consortia and NCOF-decomposer. Leaf nutrients like Ca, Mg, S, Zn, Cu, Mn and Fe levels were optimum with the application of different organic treatments (Ram and Pathak, 2005) [7].

Table 4: Calcium and magnesium content (%) in leaves of guava *cv.* L-49 as influenced by different dosage and frequency of liquid jeevamrutha

Treatment	Leaf calcium (%)						Leaf magnesium (%)					
	At flowering			After harvest			At flowering			After harvest		
	2019-20	2020-21	Pooled	2019-20	2020-2021	Pooled	2019-20	2020-21	Pooled	2019-20	2020-2021	Pooled
Dosage												
D_1	1.45^{b}	1.50^{b}	1.48^{b}	1.27^{b}	1.44^{b}	1.36^{b}	0.44^{b}	0.46^{b}	0.45^{b}	0.24^{b}	0.28^{b}	0.26^{b}
D_2	1.62^{ab}	1.66^{ab}	1.64^{ab}	1.45^{ab}	1.62^{ab}	1.53^{ab}	0.51^{ab}	0.55^{ab}	0.53^{ab}	0.31^{ab}	0.35^{ab}	0.33^{ab}
D_3	1.85^{a}	1.89^{a}	1.87^{a}	1.64^{a}	1.81^{a}	1.73^{a}	0.57^{a}	0.61^{a}	0.59^{a}	0.37^{a}	0.41^{a}	0.39^{a}
S.E.M±	0.09	0.08	0.09	0.08	0.09	0.08	0.03	0.03	0.03	0.03	0.03	0.03
C.D. @ 5 %	0.27	0.25	0.26	0.25	0.27	0.25	0.09	0.10	0.10	0.10	0.10	0.10
Frequency												
F_1	1.91^{a}	1.96^{a}	1.94^{a}	1.70^{a}	1.87^{a}	1.79^{a}	0.61^{a}	0.64^{a}	0.62^{a}	0.39^{a}	0.43^{a}	0.41^{a}
F_2	1.58^{b}	1.62^{b}	1.60^{b}	1.39^{b}	1.58^{b}	1.48^{b}	0.49^{b}	0.52^{b}	0.50^{b}	0.29^{ab}	0.33^{ab}	0.31^{ab}
F_3	1.43^{b}	1.47^{b}	1.45^{b}	1.27^{b}	1.43^{b}	1.35^{b}	0.41^{b}	0.46^{b}	0.44^{b}	0.24^{b}	0.27^{b}	0.26^{b}
S.E.M±	0.09	0.08	0.09	0.08	0.09	0.08	0.03	0.03	0.03	0.03	0.03	0.03
C.D. @ 5 %	0.27	0.25	0.26	0.25	0.27	0.25	0.09	0.10	0.10	0.10	0.10	0.10
Interaction												
D_1F_1	1.61^{bc}	1.66^{bcd}	1.64^{bc}	1.38^{bc}	1.58^{bc}	1.48^{bc}	0.53^{bc}	0.56^{abc}	0.54^{abcd}	0.31	0.35	0.33
D_1F_2	1.43^{bc}	1.45^{cd}	1.44^{bc}	1.26^{b}	1.42^{bc}	1.34^{c}	0.40^{bc}	0.43^{bc}	0.42^{cd}	0.23	0.27	0.25
D_1F_3	1.32^{c}	1.38^{d}	1.35^{c}	1.17^{b}	1.32^{c}	1.25^{c}	0.38^{c}	0.40^{c}	0.39^{d}	0.19	0.21	0.20
D_2F_1	1.87^{ab}	1.89^{b}	1.88^{ab}	1.73^{ab}	1.85^{ab}	1.79^{ab}	0.63^{a}	0.66^{a}	0.65^{ab}	0.38	0.43	0.40
D_2F_2	1.52^{bc}	1.58^{bcd}	1.55^{bc}	1.33^{bc}	1.53^{bc}	1.43^{bc}	0.51^{abc}	0.53^{abc}	0.52^{abcd}	0.29	0.34	0.32
D_2F_3	1.46^{bc}	1.51^{bcd}	1.49^{bc}	1.29^{c}	1.47^{bc}	1.38^{bc}	0.40^{c}	0.44^{bc}	0.42^{cd}	0.25	0.29	0.27
D_3F_1	2.26^{a}	2.34^{a}	2.30^{a}	2.00^{a}	2.18^{a}	2.09^{a}	0.67^{a}	0.70^{a}	0.68^{a}	0.49	0.51	0.50
D_3F_2	1.79^{bc}	1.82^{bc}	1.80^{b}	1.57^{abc}	1.77^{abc}	1.67^{abc}	0.56^{ab}	0.58^{ab}	0.57^{abc}	0.35	0.39	0.37
D_3F_3	1.52^{bc}	1.52^{bcd}	1.52^{bc}	1.36^{bc}	1.48^{bc}	1.42^{bc}	0.47^{bc}	0.54^{abc}	0.50^{bcd}	0.28	0.32	0.30
S.E.M±	0.15	0.15	0.15	0.14	0.16	0.15	0.05	0.06	0.06	0.06	0.06	0.06
C.D. @ 5 %	0.46	0.43	0.44	0.43	0.47	0.44	0.16	0.18	0.18	NS	NS	NS
J	1.24	1.05	1.15	1.03	1.26	1.15	0.33	0.35	0.34	0.18	0.20	0.19
GJ	1.03	0.94	0.99	0.72	1.00	0.86	0.27	0.32	0.30	0.14	0.18	0.16
RPP	1.57	1.54	1.56	1.33	1.53	1.43	0.42	0.46	0.44	0.31	0.35	0.33
S.E.M±	0.16	0.17	0.16	0.17	0.14	0.14	0.05	0.05	0.05	0.06	0.06	0.05
C.D. @ 5 %	0.45	0.50	0.46	0.49	0.40	0.41	0.15	0.16	0.15	0.16	0.17	0.16

Note: D_1- Application of jeevamrutha @ 500 l/ha (2.8 l /tree)
D_2 -Application of jeevamrutha @ 750 l/ha (4.2 l /tree)
D_3- Application of jeevamrutha @ 1000 l/ha (5.6 l /tree)
F_1- Application of jeevamrutha once in 15 days
F_2- Application of jeevamrutha once in 21 days
F_3- Application of jeevamrutha once in 30 days
J - Only jeevamrutha @ 500 l/ha (2.8 l /tree) once in 21 days
G- Only ghanajeevamrutha @ 1000 kg/ha (5.6 kg/tree)
RPP- Recommended package of practice (NPK @ 300:120:150 g/tree + FYM @ 25 kg/tree)

Conclusion

From the results of the study it can be concluded that, more frequent application of higher dosage of liquid jeevamrutha improved the leaf nutrient content. Significantly higher leaf nutrient status (N, P, K, Ca, Mg and S) was recorded with application of liquid jeevamrutha @ 1000 l/ha at an interval of 15 days compare to lower dosage and application at lesser intervals.

Acknowledgement
The authors are thankful to Department of Agriculture, Government of Karnataka and University of Horticultural Sciences, Bagalkot for financial assistance.

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