CHAPTER-7

PROBLEMS AND PROSPECTUS OF POMEGRANATE CULTIVATION

7.1 INTRODUCTION:

The constraint analysis is one of the central components of extension research work. Without analysis, it is not only difficult to understand how growers cope with problems by adopting remedies but also it would ineffective to give any suggestions for mitigating the problem in view of sustainable development of pomegranate farming. Hence there was a genuine need for a systematic analysis of different kinds problems faced and management strategies adopted by growers. This assumes particular significance for fruit farming in drought prone regions like study area, which is often affected by adverse weather and a host of other risks and worries.

Despite of technological and economical advancements the condition of pomegranate growers continues to be unstable due to the broad range of constraints in its production. The continuous adoption of pomegranate crop by growers resulted into putting more area under its cultivation. At the same time, it was also found that some growers were cutting down or uprooting their orchards. The fundamental cause behind it was an epidemic spread of devastating bacterial blight and wilt diseases on pomegranate, whose incidences and attacks caused huge economic losses to growers. Consequently, growth of pomegranate crop was hampered by all such problems; those had enough potential to reduce the yields and disturb the livelihood of grower.

Keeping in mind the facts known during field survey, present topic was aimed at the analysis of the problems faced by growers. And it was also intended to focus the light on future prospects of pomegranate farming in the changing scenario of its cultivation practices in the study area.

The problems faced by the growers were listed during pre-test and also in consultation with experts in the field of pomegranate. Then, a fourth part of questionnaire for field survey was devoted to the problem statement of the respondent. In addition, their expectations from researchers, government or non-government organizations were also understood.
Based on the responses of sample growers, the problem wise percentage analysis was carried out. The cause and effect relationship within the problem was also examined. Subsequently remedies adopted by respondents for mitigating the problems were described. Lastly, possible suggestions; those are economically and technologically acceptable to the growers were given.

The explorative field survey and extensive discussion with respondents helped in assessing the ground realities, quality access and the constraints faced at the field level. The personal opinions of respondents were instrumental in providing detailed information; which helped

- to be acquainted with the actual cultivation practices adopted by growers
- to discover the gap between lab to land extension of pomegranate research technology
- to know the shortcomings in planning and implementations of various horticultural schemes implemented by Agriculture Department (GoM).
- to recognize the current issues needing immediate attention and to give applicable suggestions for sustainable pomegranate cultivation.

The discussion with respondents revealed the complex nature and broad range of problems from planting, interculturing, harvesting to marketing their crops. Some of them were common problems while others were faced at the individual level. Nevertheless, the problems are attributed to various environmental factors so that can be broadly classified into eight categories as below:

i) Natural factors
ii) Technological problems
iii) Material inputs
iv) Financial constraints
v) Labour shortage
vi) Electricity shortages
vii) Marketing Problems
viii) Insect pest problems

The special focus was placed on the devastating wilt and bacterial blight diseases that hampered pomegranate cultivation all over the study area. In this
context, the major problems and strong issues that need immediate attention for sustainable pomegranate farming are discussed in the section below.

7.2 NATURAL FACTORS:

Although cultural practices, varieties and seasons of pomegranate fruit production are almost same in the study area but natural environmental conditions like topography, soils, temperature and rainfall amounts are sufficiently variable to affect the yield and quality of pomegranates. Apart from it, the natural disasters like hailstorms (Phayan storm) prevailed during Bahar period also spoiled the yields.

7.2.1 Unfavourable topography:

The pomegranate orchards in sampled villages namely Chinchave and Galane (Malegaon tehsil), Pophir and Kotbel (Satana tehsil) and Pokhari (Nandgaon tehsil) were raised on undulated terrains like barren and waste slopes. About 14.16% respondents were facing difficulties in cultural operations due to unsuitable terrains.

Cause:
Good monetary returns from pomegranate crop, which even survives in very shallow soil, provided the best opportunity for growers to expand agriculture holdings by making use of their previously uncultivable lands.

Effects:
The genuine problem on unleveled surfaces was controlling of soil erosion caused by heavy rains and soil tillage practices also become difficult. The installation cost of drip irrigation system was increased by 5-10% on undulated surfaces. Eventually utilizing barren lands raises the production cost.

Remedy:
It was found that pomegranate growers with enough financial resources hired JCB machines and tractors for terracing the foothills or for leveling the uneven surfaces.

Suggestion:
For prevention of soil erosion from heavy rains, Roy (1999) had suggested diverting the water channel to run along the rows of tree rather than straight down the slope. If the gradient of the slope is high terraces needs to be constructed.
7.2.2 High Temperature:

The respondents to the extent of 60.24% were suffering from high temperatures. The maximum temperatures during the months of April and May are often recorded between 42°C to 45°C in high concentration zone of pomegranate particularly in Malegaon, Satana and Deola tehsil. Though pomegranate trees can withstand up to 50°C but there would be notable differences in plant’s physiological processes (Mitra 1999). The high temperature causes excessive heating of tree canopy and fruits; those are exposed to direct solar radiation. It leads to increase the rate of evapo-transpiration from the leaves and excessive soil water loss during summer season consequent into more demand for water when it is in shortage.

Cause:

The tropical location of the study area, it is abandoned with bright sunshine throughout the year but more intensively during summer season.

Effects:

The moisture stress to pomegranate orchards results into physiological disorders like cracking or splitting of fruits reaching to maturity. The respondents to the extent of 19.20% were suffering from this type of disorder. Strong solar radiation increases the fruit surface temperature causing sunburn or sunscald disease on the skin of pomegranate fruits. The disease was stated by 21.19% respondents. The sunburned and cracked fruits though sweeter in taste but lowers the marketable quality and sometimes in severe cases liable to rot. If its proportion is high in total produce then affects on return from the orchard.

Remedy:

In order to protect the mature fruits from direct exposure to insolation or sun rays falling on fruits, the pomegranate growers usually covered surface of fruits by stapling piece of waste papers (old newspaper).

Suggestion:

Soil moisture conservation technique can be adopted by covering orchard soils with organic mulches such as sawdust, maize husk, bajara husk and sugarcane trash so it will help in minimizing rate of soil evaporation.
7.2.3 Natural Disasters (Phayan Cyclone):

The pomegranate growers have been struggling with one challenge after another. In addition to adverse weather conditions, the 22.48 % respondents had suffered, the cyclonic storm ‘Phayan’ occurred on 10th and 11th Nov 2009 that caused widespread rainfall with isolated heavy to very heavy falls occurred over Goa, Konkan, central and Madhya Maharashtra (includes the study region). According to a preliminary report of Indian Meteorological Department on ‘Phayan cyclone’, the amount of daily rainfall recorded was as high as 7 cm and 5 cm on 10th and 11th Nov 2009 respectively in the study region. And the maximum wind speed was recorded between 60 - 80 km hr \(^{-1}\).

The hail storm prevailed over half an hour left half foot thick sheets of ice pellets over the fields caused damage to standing crops and roots of trees. In the study area, Niphad and Yeola tehsils were severely affected than others. The worst affected villages were namely Manjargaon, Mhalsakore, Khangaon Thadi, Nandur Madhyameshwar, Tarul Khedle, Tamaswadi, Karanji, Brahmanwade and Gajarwadi.

According to Relief and Rehabilitation Dept. (Government of Maharashtra), output of pomegranate fruits in Sangali, Solapur and Nashik districts declined by 25-30%. Unexpected heavy rainfall coupled with hails caused damages to mature fruits. As far as study area is concerned, officially total 2.29 lakh ha agriculture area was affected. Out of it, 6488 ha area of grapes and 367 ha under pomegranate were recorded more than 50 % loss.

**Cause:**

According IMD, the deep depression was formed on 9th Nov 2009 over the southeast and adjoining east central Arabian Sea. The Phyan cyclone moved North Eastwards and crossed the Maharashtra coast between Alibagh and Mumbai. The deep depression over north Madhya Maharashtra weaken into a depression and remained practically stationary and lay centred close to Nasik at 3.30 hrs IST on 11th November, 2009. It moved northeastwards and weakened gradually.

**Effects:**

Heavy rains coupled with hails and strong winds of Phayan cyclone caused direct and indirect losses pomegranate orchards.
• Mrig Bahar yield was completely destroyed due to damages like cracking and dropping half of matured fruits. Whatever remained that was also of poor quality.

• Hasta Bahar was totally delayed due to dropping of flowers and flower buds. And in few cases reduced the number of fruit sets per tree ultimately affected the yields.

• The standing pomegranate trees were also badly ruined. The strong winds damaged trees by physically breaking branches and by toppling entire trees. To illustrate, stems were bifurcated at the upper parts and some trees were pushed up several inches above their original position i.e. either uplifted or uprooted and flattened out due to strong cyclonic winds.

• Affected growers faced severe financial constraints due to yield losses. They wasted their moneys imputed for production and worried for the next cropping season. They were also unable to repay agricultural loans.

Remedy:

In case of Phayan cyclone, Agri officials (GoM) came up to help by providing the financial compensation to all affected farmers in the study region.

Suggestion:

The central and state government has programs of rescheduling loans to farmers affected by natural calamities. So loan of those farmers could be rescheduled i.e. interest liability of borrowers should be waived and repayment schedule extended up to 2 years in order to make them eligible for fresh loans.

7.3 TECHNOLOGICAL CONSTRAINTS

It was observed that respondents had insufficient knowledge about application of exact dosage of fertilizers, pesticides and water management. They were also lacking in skills for pruning, thinning and soil sampling etc.

7.3.1 Soil Testing:

The soil testing is vital in identifying nutrient requirements and applying fertilizers to orchards nevertheless growers were not aware of its importance. It was clear from the responses of growers that only 5.53% respondents tested their orchard
soils regularly once in a year. In this context, table No.7.1 show that growers were not satisfied about the soil lab reports and expressed a variety of constraints. About 10.57% respondents were not satisfied and complained that soil reports are unreliable even after paying costly fees.

Few of them raised questions at the time of interview i.e. why soil labs give different reports even provided soil samples were same? Why fertilizer recommendations from labs considerably varied for same soil samples? In this context, soil lab technicians answered that the fundamental cause of variation in results is the methods, chemicals and accuracy of the equipments used. The methods would vary even to extract same nutrient that in turn effect on the final results.

**Table No. 7.1 Constraints in soil testing**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Statement of Constraint</th>
<th>Number of respondents</th>
<th>Percent in total</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Soil testing facility is not readily available</td>
<td>212</td>
<td>46.69 %</td>
</tr>
<tr>
<td>ii</td>
<td>Lack of knowledge of about soil sample collection</td>
<td>363</td>
<td>79.96 %</td>
</tr>
<tr>
<td>iii</td>
<td>Soil testing reports were necessary for subsidy</td>
<td>324</td>
<td>71.36 %</td>
</tr>
<tr>
<td>iv</td>
<td>Result of soil testing from labs are unreliable</td>
<td>048</td>
<td>10.57 %</td>
</tr>
<tr>
<td>v</td>
<td>Different soil reports for same soil samples</td>
<td>060</td>
<td>13.22 %</td>
</tr>
<tr>
<td>vi</td>
<td>Soil testing is wastage of time and money</td>
<td>235</td>
<td>51.76 %</td>
</tr>
</tbody>
</table>

(Source: Compiled by researcher)

**Causes:**

Usually growers do not collect samples properly, randomly only one or two depths are sampled. Obviously, collected soil samples do not adequately represent the whole orchard area and there is no guarantee that sampling spots are located in intense root activity from which tree gathers its mineral nutrition. Therefore, even after following recommended doses of fertilizers as per soil lab reports the crop yield would not increase.

It is notable that Agri. Dept. (GoM) made it mandatory to test orchard soils for every pomegranate grower in year 2009 for gaining subsidy amounts to control epidemic spread of bacterial blight and wilt disease. But the soil report
simply remained a necessary document for subsidy and practically it was of no use.

**Effects:**

The absence of soil specific nutrient doses may result in yield losses even after making huge expenditure on account of fertilizers. For instance, deficiency of boron element causes cracking of mature fruits. Besides it improper fertilizer application also leads to deterioration of soils. About 86.28% respondents stated that the fertility of orchard soils is declining day by day.

**Remedies:**

Pomegranate growers make day to day observations and identify deficiencies in trees by visual symptoms. They also consulted to progressive farmers and agro input dealers. Such practical knowledge helps them in the application of fertilizer doses to their orchards.

**Suggestion:**

In order to make soil testing results more meaningful, Agri. Dept. (GoM) or NGO’s should organize training programs for ‘soil sample collection’, in which field level demonstrations in front of growers are essential. Moreover, there is a need to set uniformity in laboratory standards, tests and analysis for doing soil testing more reliable. And there is need to encourage local agriculture graduates by providing them financial assistance to establish ‘Agri Clinics’ in pomegranate regions.

**7.3.2 Drip irrigation:**

Drip irrigation having various components like network of mainline, sub lines and lateral lines with emitters, pressure pumps, ventury, pressure regulators etc. that requires maintenance and proper knowledge of water application to achieve the efficiency in irrigation. However there were few problems in using the drip systems.

i) **Problems in Regular Maintenance:**

Drip irrigation requires good quality of water and regular repairs and maintenance for uniform distribution of water per tree. But 30.57% respondents faced difficulties in keeping the system operational.
Causes:

The drip systems in the study area are mostly operated on bore well water i.e. hard in nature containing more salts, which causes clogging or chokes of drippers. Similarly, the biological agents like algae and tiny soil particles that build up in the plastic tubes can block the small openings of drippers. The damage to drip tubes could also be caused by insects, rodents, or birds, they create large leaks or by farming operations like soil tilling, manual weeding with a hoe.

Effects:

The choke of drippers may lead to unequal water distribution and causes improper growth of trees or plant may also die due to restricted root development.

Remedies:

In order to regulate water filtration the growers used phosphoric acid in smaller quantities for cleaning small emitters or drippers. This treatment also provides phosphorus nutrient to the soils. The drip tube lines in few orchards were fastened with wires or ropes or lightly covered with soils and plastic mulches.

Suggestion:

Once in a week regular cleaning of the filter and drip tube lines are essential. The tiny soil particles in the piping can be sucked out or blown out easily when dry. If the proper care is taken then drip kit would last up to 15 to 20 years. In this regard, planning is needed for recycling and reuse of drip tubes.

iii) Lack of water management:

In addition to limited availability of water, about 46.15 % respondents were lacking in knowledge of water application and management. It is difficult for growers to determine how much water to apply and when to irrigate the crop. Although pomegranate yields can be improved by a drip irrigation system but lack of irrigation scheduling increases chances of under or over watering.
Causes:

There is a high degree of variability in physical factors such as soil types; weather conditions in particular locality as well as cultural factors like adopting cropping season, age of orchard etc. Therefore practically for lowly literate grower it is difficult to understand daily water requirements of crops. On the whole, the absence of scientific methods leads to mismanagement of water application.

Effects:

Under-irrigation leads to moisture stress, whereas over-irrigation wastes water and leaches expensive nutrients below the root zone out of reach of plants. Irregular moisture causes dropping of flowers or develops small fruits (Patil and et all 2002). The sudden change in soil moisture causes fruit cracking (Singh and et all 2006).

Remedies:

The major factors in grower’s consideration for irrigation are visual symptoms of water stress, the adopted Bahar, soil type and weather conditions. In general the orchards having light soils were irrigated more frequently than heavier soils.

Suggestion:

Water is a limiting factor in the dry regions like study area. Therefore under this constraint, it is essential to utilize water input on the scientific basis to get a remunerative crop.

The experts from proposed pomegranate sub research station of MPKV at Lakhmapur in Malegaon tehsil of study area could provide scientific guidelines to growers. Thereby estimating crop water requirements (liters / day / tree) based on meteorological data obtained from weather observatory, which is also expected to be established at above sub research centre.

7.4 MATERIAL INPUT

The fertilizers and pesticides are two basic material inputs for pomegranate orchards. Its application on proper time, method and exact doses determine the quality and quantity of fruits. But there are certain problems in material input.
7.4.1 **Fertilizers:**

The pomegranate orchards in study area are successfully grown in light soils, it requires integrated nutrient management by applying frequent application of organic as well as inorganic fertilizers in split doses. In contrast, table no 7.1 show variety of constraints in fertilizer application.

**Table No. 7.2 Problems of Fertilizers Inputs**

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Statement of Problem</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Non-availability of chemical fertilizers on time</td>
<td>90.72%</td>
</tr>
<tr>
<td>ii</td>
<td>Liquid chemical fertilizers are costlier</td>
<td>53.29 %</td>
</tr>
<tr>
<td>iii</td>
<td>Non- availability of farm yard manure</td>
<td>85.43 %</td>
</tr>
<tr>
<td>iv</td>
<td>Inferior quality of other organic fertilizers</td>
<td>34.81 %</td>
</tr>
<tr>
<td>v</td>
<td>Bio-fertilizers are expensive</td>
<td>45.17 %</td>
</tr>
</tbody>
</table>

*(Source: Compiled by Researcher)*

i) **Chemical fertilizers:**

About 90.72% respondents stated that getting adequate quantity of fertilizers on proper time is a persisting problem and fertilizers supplied by private agencies were often in shortage. Fertilizer bags are underweight and not properly sealed. Likewise, 53.29% respondents stated that liquid chemical fertilizers are costlier.

**Causes:**

It is widely believed the racket in illegal trade of fertilizers creating artificial shortages. Moreover, it is a general belief among growers that the application of more fertilizers would result in higher yields. On the other side, its volume of production by private companies is low so unable to meet increasing demands.

**Effects:**

During the peak shortage period, chemical fertilizers were sold at higher prices that in turn increases production cost. And at the certain places, it was sold under strict supervision of government authorities. Hence the state government
should implement rational schemes to maintain sufficient stock and
distribution of fertilizers.

Remedies:

The pomegranate growers overcome on this difficulty by making a stock of
chemical fertilizers when they are easily available in the local market.

Suggestion:

In view of sustainable pomegranate production, it is necessary to create
awareness among growers for use of organic and bio-fertilizers which will not
only increase the “inbuilt resistance capacity” of pomegranate trees against
pest diseases but also help the growers to practice the organic pomegranate
farming. As a result, there will shifting from high volume to high value
(export oriented) pomegranate production. In this context, guidelines on how
to do organic farming and bio-fertilizer policy inclusive of mass production
needs to be implemented by Agri. dept. (G o M).

ii) Organic fertilizers:

With the expansion of perennial agriculture especially horticulture in general
and pomegranate orchards in particular, the fertilizer demand and prices are
increasing day by day in the study area. In this situation, availability of fully
decomposed farm yard manure (hereafter called as FYM) was identified as major
constraint by 85.43% respondents. Similarly, lack of guaranteed quality organic
manures like neem cake (Neem Seed Kernel Extract), mix organic fertilizers and
vermi-compost was the problem stated by 34.81 % respondents. About 45.17 %
respondents stated high cost of good quality bio-fertilizers viz. PSB (Phosphate
Solubilizing Bacteria), Azatobacter, Trichoderma and lack of technical knowledge
were the main problems in its application.

Cause:

In a modern farming era, the use of animate energy show a declining trend and
low animal population ultimately resulted in reduction of mass production of
FYM.
Effects:

Due to shortage of FYM, its cost is increasing by 15 - 20 % every year. And high prices of FYM have also attracted poor and marginal growers to sell whatever little FYM they had and instead purchase chemical fertilizers. The shortage of FYM coupled with high prices leads to increased dependency on chemical fertilizers. And overuse of chemical fertilizers leading to declining fertility of soil.

Remedy:

Few respondents also cleared that due to shortage of FYM in native area they bought it at higher rates from neighboring districts.

Suggestion:

Overall, application of organic manures is essential to restore the soil fertility. Therefore at least few milking animals should be kept at every farm not only to fulfill FYM need but also to generate additional income.

Only 3 respondents had own vermi-compost production units. Recycling of crop residues for vermi-compost is a new concept for growers. The material required for production of this fertilizer is widely available in rural areas. So growers should given training to prepare it on the farms. Therefore awareness should be created among growers for its production and utilization in the field.

7.4.2 Pesticides:

The insect pests not only causes moderate to heavy losses but also responsible for the spread of bacterial, fungal and viral pathogens causing various infectious diseases like leaf and fruit spots, fruit rots and root rots etc. Hence in order to protect the orchards spraying of different chemicals at least once in a week during bahar period and in a month during rest period. But sampled growers faced few constraints in chemical inputs as below.

i) High expense and Inferior Quality of pesticides:

The major constraint perceived by 91.13% sample growers was high cost and expenses of plant protection chemicals. In spite of high costs, 86.30% respondents also argued that pesticides often lack in guaranteed quality. The agro service centre holders or dealers do not display the rate lists of pesticides.
Causes:

High power pesticides with good brand names are costlier. But it becomes essential to use such expensive chemicals because of increasing incidences of insect-pest attacks especially bacterial blight and wilt disease. The impurities formed during manufacture can lower the power of pesticide and adulterated pesticides were also sold in local markets.

Effects:

About one fourth of gross cultivation cost was dedicated on plant protection chemicals. Inferior pesticides were ineffective in controlling the pest or diseases that in turn increase production cost ultimately it can also affect on the yields.

Remedy:

High power pesticides were essentially used by medium and large farmers but small growers commonly preferred low priced products. Retail prices of the same chemical varied from one company to another; which is often fixed after negotiations.

Suggestion:

The steps should also be taken to check the quality or adulteration of pesticides and government intervention is needed to fix retail prices of agro chemicals. In addition, the resistant capacity of pomegranate trees against insect-pests can be increased by good nutrient management so pesticide use will be minimized.

ii) Lack of technical know-how:

About 39.61% respondents lacked in knowledge about taking exact dosage of pesticides, skills for spraying, making solutions, concentration of chemicals and appropriate product to be used etc.

Causes:

More than two fungicides or insecticides are mixed together, in addition, some micro nutrients e.g. boron or growth hormones are also added in spray solutions. Making such solutions was difficult task for lowly literate growers.
The information on or with a pack of agro-chemicals are printed in many languages containing technical terms and in a small letter (fonts) that ordinarily pomegranate can hardly read and understand what it contains. Sometimes outdated pesticides may be used.

Effects:

The large scale indiscriminate use of agro-chemicals in the absence of any guidance resulted in non targeted controls, in other words, deskilling of organisms like pollinating insects.

In contrast, unnecessary spraying also allowed the targeted pests to develop resistance against pesticides. It not only inclined production expenses of grower but also increased chemical toxicity of fruits consequent health hazards, pollution of agro environment etc. If not checked on proper time, the pomegranate farming would become unsustainable in the study area.

Remedies:

In case of insect pest and disease occurrence growers firstly consulted to agro-service centre owners, who often provided chemicals and guidelines for its use. However it is often in favour of their business i.e. profit making as well as oriented towards their dealership of the particular pesticide company.

Suggestion:

The interference that could be drawn from above discussion is that the deadly chemicals having hazardous effects are causing damages to pomegranate ecosystem. The adverse impacts of pesticides presently need attention for a safe and effective measure of pest control. Therefore, detailed information about pesticide use and its effects in easier languages should be printed on the product. In addition, literature regarding good management practices could be enclosed in packing to educate their distributors, dealers and growers.

For extension support, the private pesticide companies should be called together with state Agri. Dept. and pomegranate growers in training programs. The pesticide companies should not only expected to share the financial expenditure but also actively participate and organize field demonstrations, group discussions, seminars, exhibitions in order to convince the pomegranate
growers about the proper use of chemicals as well as to give assurance about their product quality.

7.5 FINANCIAL CONSTRAINTS:

Ever since from the adoption of pomegranate crop the growers always earned good profit ranging from ₹ 60,000 to ₹ 1.5 lakhs acre	extsuperscript{-1} annum	extsuperscript{-1}. Now. It is worth mentioning that uncontrollable bacterial blight and wilt diseases in orchards is a major cause of concern for putting growers in severe financial constraints. The cost is added up by control measures adopted for it, in addition, the prices of fertilizers, pesticides and labour wages are hiking day by day. Significant percentage of respondents about 86.63% expressed that cost of pomegranate production is rising every year by 10-15%. Table No.7.3 shows that growers had their own set of worries for capital inputs.

Table No. 7.3 Financial Constraints of Respondents

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Financial constraint</th>
<th>Percent in total</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Production cost is increasing</td>
<td>86.63%</td>
</tr>
<tr>
<td>ii</td>
<td>Inadequate crop loans</td>
<td>64.01%</td>
</tr>
<tr>
<td>iii</td>
<td>High interest rates on the long term agri. loans</td>
<td>46.13%</td>
</tr>
<tr>
<td>iv</td>
<td>Documentation for loan is difficult</td>
<td>39.51%</td>
</tr>
<tr>
<td>v</td>
<td>Non availability of loans in time</td>
<td>43.48%</td>
</tr>
<tr>
<td>vi</td>
<td>Inability to repay loans in time</td>
<td>19.46%</td>
</tr>
<tr>
<td>vii</td>
<td>Constraints in government subsidies</td>
<td>39.73%</td>
</tr>
</tbody>
</table>

(Source: Compiled by researcher)

7.5.1 Agriculture Loans:

Presently, the loan amount sanctioned for pomegranate crop is only ₹ 75000 ha	extsuperscript{-1} but average expenses on cropping season are nearly double. Because of this disparity, 64.01% respondents stated inadequate credit is available so unable to meet production expenses. And 43.48% of them complained undue delay in dispensing the credit. Besides, the growers also need finance for development of agro farms like
irrigation infrastructure, buying tractors, farm houses etc. But about 39.51% respondents expressed that nature of loan procedure followed by banks is complicated and time consuming. And 46.13% respondents stated high rates of interest on development loans (13 - 15%) as compared to only 4% interest rates on crop loan.

**Causes:**

Assessment of crop loan is not based on financial inputs required for this crop. Individual branch of financial institutions distributes loans as per guidelines of their head office having fixed targets. And they take into account the availability of funds in a financial year for agriculture sector, repayments, number of defaulters etc.

**Effects:**

Since, the majority of growers are small orchardists, who cannot afford expensive inputs due to personal financial crisis. As such under financial position hinder growers in pursuing scientific pomegranate production. Inadequacy of capital was also responsible for slow adoption of improved agro technology like agro-ponds, polythene mulching, shade-net etc. Overall, it also results in missing the opportunity to exploit favourable agro-climatic conditions for pomegranate crop.

**Remedy:**

The cropping season of pomegranate extends for 5-6 months, when there is no income to grower. But he needs finance at all stages of crop growth for material inputs. So growers were found to depend on their own savings or borrowed from relatives or friends to engage their farming activities. And they were mainly dependant on financial returns from the orchards for developing farm infrastructures.

**Suggestion:**

There is growing demand by pomegranate orchardists to increase the crop loan amount up to ₹ 2 lakh ha⁻¹. The financial credit is said as lifeblood in modern farming era. Hence, there is an urgent need to revise the existing scale of finance by considering the current production cost of pomegranate. For providing timely credit facility the State Bank of India issue Kisan Credit Card
(KCC) to growers so that they can avail credit as and when required. It is a type of short term loan. Likewise efforts can be made by other commercial banks existing in rural areas of study region.

Delayed credit is often said as denied credit. Therefore simplification in procedure, flexibility in security norms, time bound credit delivery, interest rates are important factors required to be modified for expanding the credit. Today, lots of core banking and intra banking services are taking place with common understandings that also could be applied to simplify loan procedures such as getting no dues information.

7.5.2 Government Subsidies:

Though an ongoing subsidy scheme for plantation of pomegranate under EGS was availed by 66.37% respondents but beneficiaries received amounts after a year of orchard plantation. Special relief package ₹50000 ha\(^{-1}\) for mitigating bacterial blight and wilt disease on pomegranate was sanctioned but it was too late in adopting control measures. The sample growers also opined that the basis for selection of beneficiaries is not well defined; only 4.84% respondents belonged to large and medium growers were benefited for the micro irrigation ‘agro pond’ scheme.

Causes:

When preparing any subsidy scheme by the government officials, neither pomegranate growers are consulted nor their demands taken into account. And there is a lack of publicity and knowledge of the scheme among growers. Even if known, faced procedural difficult to satisfy criteria laid down for procurement of schemes.

Effects:

Delay in payments creates financial difficulties particularly to small growers in purchasing the quality planting material like tissue culture saplings, biofertilizers etc. The bacterial blight disease spread in epidemic proportion and few growers were worst affected and uprooted their orchards. So they were deprived from the relief package, in true sense, the schemes are not reaching the needy and deserving growers.
Remedy:

The growers prefered saplings from local nurseries, practicing intercrops, apply flood irrigation in the initial years and wait for plantation subsidy amounts. In case of disease attacks, the growers tried hard to save the orchards and invested moneys from their personal savings or borrowed from relatives.

Suggestion:

Advanced payments of subsidy amounts before plantation would be disbursed to growers. Special counters within easy reach of growers could be opened at govt. offices for simplifying procedures and immediate delivery of relief subsidy amounts. In order to avail the benefits of subsidy schemes, policies and loans; the Agri. Dept. and banks should convey farmers gathering jointly by organizing camps and seminars.

7.6 LABOUR SHORTAGE:

Contrary to the belief of unemployment with increasing human population, the critical problems were acute shortage of all types labour (unskilled, semi-skilled and skilled) faced all over the pomegranate growing regions. Along with the expansion in pomegranate orchards in the study area, day by day their demand was also increased. So, growers presently find it difficult to finish labour task in stipulated time.

Table No. 7.4 Labour Problems of Respondents

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Statement of Problem</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Casual labour is not available on time</td>
<td>93.39 %</td>
</tr>
<tr>
<td>ii</td>
<td>Shortage of permanent labour</td>
<td>45.81 %</td>
</tr>
<tr>
<td>iii</td>
<td>Higher wage rates of labour</td>
<td>92.49 %</td>
</tr>
<tr>
<td>iv</td>
<td>Difficult to supervise the labours</td>
<td>77.53 %</td>
</tr>
<tr>
<td>v</td>
<td>Labour Migrate to urban places</td>
<td>28.85 %</td>
</tr>
</tbody>
</table>

(Source: Compiled by researcher)
Causes:

Explorative interviews with respondents stated some socioeconomic reasons responsible for labour shortage that in turn resulted in higher wages.

- Socially rural youths are not willing to undertake any physical work in agriculture. About 28.91% respondents opined that withdrawal of young labour and migration to urban areas was the main reason for its shortage. It is higher wage rate ₹200 day$^{-1}$ and transport facility provided by employer attracts them to urban centres.

- Increased or high rates of wages in sampled villages were also due to socially organized collective action of labour groups. They possess the better bargaining power and demand higher wage rates for farm works.

- Implementation of freebie schemes by government on behalf of welfare measures are fulfilling the basic needs of labour like free food items, clothes, shelter, schooling, medical treatment etc. So they work only 2-3 days in a week to meet their other daily expenses and remain idle for rest of days.

Effects:

- Due to high wage rates, the labours are considered far expensive with reference to their work done in only 5-6 working hours. Nearly 15-20% of total annual costs of pomegranate cultivation were incurred on labour inputs.

- Skilled labour shortage for sorting and packing of fruits force the growers to sell their produce in loose form at low prices ₹5-10 kg$^{-1}$ than prevailing market rates.

- Due to high wages of skilled labour, pruning is done as more routine operation by unskilled labour and sometimes family members. But the absence techniques of pruning create several problems like excessive top pruning stimulates vegetative growth and suppress flowering. Overall, it can affect on yields from the orchard.

- Many intercultural operations suggested under GAP (Good Agricultural Practices) are labour intensive. But due to labour shortage, the growers opt for the use of herbicides in spite of manual weeding; apply more chemical fertilizers than organic slurry. It leads to excess use of chemicals that is ecologically harmful.
Remedies:

- There was great interest in all growers to reduce the reliance upon labour for cultural operations. Small tractor driven equipments or mechanical devices e.g. Soil tillers, blowers for spray, picking trolleys to collect harvested fruits, slurry tank for organic fertilizers, fertigation are now utilized in pomegranate growers.

- By paying attractive wage rates; the large farmers often employ in-migrant labour available in tribal villages of Peth, Surgana and Kalwan tehsils of the study region. These labours are hard workers so finish the job in half of the time.

Suggestion:

- Social actions by small orchardist like team work thereby compulsory sharing of labour work was found a best solution to mitigate problem of labour shortage. In the ‘sharing method’ grower does not pay in cash but instead returns labour days by working in group member’s field. The growers help or work for each other in the time of labour crisis; everybody receives same labour days from group members. Moreover, group members work for 8-9 hours on labour sharing days to complete the task. For instance, in sampled villages the labour sharing method was more popular among female group members for manual weeding of the orchard as well as for spraying and harvesting operations in male group members.

7.7 ELECTRICITY SHORTAGE:

The irrigation and spraying are two important operation in pomegranate farming. The summer cropping season (Aambe Bahar) requires consistency in irrigation while rainy cropping season (Mrig Bahar) requires frequent spraying. Thus, any loss of power supply would severely affect the yield of pomegranate. Table No. 7.5 shows that respondents were clear to express specific problems of electric supply.
Table No. 7. 5 Problems of Electric Power Supply

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Statement of Problem</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Shortage of Electric Power (Load shedding)</td>
<td>96.03%</td>
</tr>
<tr>
<td>ii</td>
<td>Voltage Fluctuations</td>
<td>96.48%</td>
</tr>
<tr>
<td>iii</td>
<td>Delay in Electricity repairs, new connections etc.</td>
<td>13.87%</td>
</tr>
<tr>
<td>iv</td>
<td>High cost of Electricity Bills</td>
<td>6.88%</td>
</tr>
</tbody>
</table>

(Source: Compiled by researcher)

Causes:

- The rivers are dried up reducing the power generating capacity of hydroelectric power stations but the demand rising up. The situation in summer tends to be lots of power cuts when the need is perhaps to be greater.

- The Nashik is deemed as the third most industrialized city of Maharashtra after Mumbai and Pune. There are 5 industrial zones in the Nashik area viz. Satpur, Ambad, Sinnar, Igatpuri and Dindori. So there is high demand for electricity from this sector. Moreover, the domestic needs of electricity also have gone up due to increasing population and urbanization.

- The GoM provided support to MSEB by making laws to discontinue the illegal tapping of electricity. Still, the rampant hooking of electricity on distribution lines was observed during the field survey at the pomegranate farm. Thus, high transmission and distribution losses also cause power shortages, voltage fluctuations as well as higher costs of electricity to end users like pomegranate growers.

Effects:

- About 43.26 % respondents were often wasting their lots of time in waiting for a power supply, which is absent during daytime in farm working hours. The night phase of power availability led the growers to use automatic starters. But with arrival of supply all pump sets start simultaneously resulting in heavy load on transformers consequent low voltages.
Because of high evaporation irrigation need increases during the summer but irregular power supply causes water stress or moisture fluctuations in soils that may cause physiological disorders like cracking of fruits.

Voltage fluctuations in three phases lead to motor burn-outs in pump sets. The aggregate amount of outstanding dues against electricity bills was too high to be paid by growers. There is no improvement in quality of power supply leading to dissatisfaction with MSEB services so pomegranate growers often suspend to pay bills for electricity.

Remedies:

In absence of electric power pomegranate growers preferred to use the stationary power sources like diesel engines for water pump sets, small light weight generators. While large category respondents were found to use tractor based spray equipment known as ‘blower’.

The branded equipments represent a costly investment so few respondents preferred to buy locally manufactured or altered equipments. Two villages namely Kikwari (Satana tehsil) and Pimpalgaon-B (Niphad Tehsil) are well known in study area for making power saving small scale fabricated units.

Suggestion:

Growers expect that the MSEB should provide uninterrupted supply of electricity at least for 12 hrs / day without any voltage fluctuations. Thus, MSEB is fighting with insufficient power supply due to inadequacies in generation. Therefore, MSEB should tie up with private companies like reliance power or any other to fulfill the demands of valuable orchard crops.

It is also essential to develop non-conventional energy sources or renewable sources like solar, wind and nuclear energy to overcome on energy shortage.

7.8 LOCAL TRANSPORTATION:

Different vehicles are used by respondents for to and fro transport from pomegranate villages to urban places. Relatively small volume of produce was brought to local markets every day. In each trip at least 2 - 6 plastic crates (20 kg capacity each) of fruits were transported with travel speeds up to 20 - 25 km distance. And in return journey if required, the material inputs such as pesticides and fertilizers
were also transported. The paths, cart tracks and intra-village roads serve as important functions in pomegranate farming like daily movement of grower and labour, trips for farm inputs, collection and marketing of harvested fruits etc. But the lack of adequate road connectivity was the constraint faced by 30.76% of the respondents in local transport. Some farm roads were reported to inaccessible or impassable during rainy season. They are low level roads mostly gravel or earthen surfaces.

**Causes:**

Though ‘Prime Minister Gram Sadak Yojana’ and ‘Bharat Nirman Programs’ is undertaken by Govt. of India but maintenance of farm roads is highly neglected.

**Effects:**

Poor condition of farm roads constraints the mobility of growers by limiting the speed of the vehicle. The vehicle vibrations resulting from undulations and irregularities of the road surfaces coupled with poor carriage methods (fruits filled in plastic crates) causes mechanical damage to fresh pomegranate fruits as like bruising.

**Remedies:**

Growers keep leaves of various trees at the bottom and top of plastic crates. This practice prevents mechanical damage resulting from vehicle vibrations and accidental fall of fruits during transportation.

**Suggestions:**

Routine maintenance of farm roads needs to be attended frequently. These roads could be maintained or developed using local contractors for civil works in accordance with the procedure Public Works Department (PWD) of Government.

**7.9 MARKETING PROBLEMS:**

As stated earlier, the major constraints in marketing of pomegranates are lack of information about distant markets, high transport cost, labour shortage for packing as well as defects in the markets like high commission charges, number of deductions, fluctuation in prices, and so on. With all this kind of market imperfections, the returns from pomegranate like other agriculture commodities are also subject to large fluctuations in general. But in particular, significant proportion of respondents
44.15% faced problems while dealing trade with private trader e.g. low prices for the produce, larger volumes of rejected produce, non payments, violation of contracts etc.

**Causes:**

The private traders bear all marketing expense, therefore, low prices ₹ 5 - 10 kg\(^{-1}\) than prevailing market rates are offered by them. Taking into consideration requirements of the national market, traders often make an agreement with growers to purchase good quality fruits of above 100gm weight. The blemished and cracked fruits were also unwanted.

**Effect:**

If not properly supervised significant proportions of produce is rejected by sorting and grading labour. It affects on monetary returns from the orchard. Under adverse circumstances like falling market prices traders may be discouraged. And he can violate contracts or agreement with growers.

**Remedy:**

Either abandoned or returned produce was sold in local market by the grower.

**Suggestions:**

Business skill among the grower community needs to be improved for national marketing by forming co-operative grower organizations. For the pomegranate growers be able to use or comparable price data of different markets, the marketing experts suggested an urgent need of implementation of uniform national grading and packing system applicable all over the country. So with it growers will be familiar, there is also need to establish fruit processing units and cold storage facilities on a large scale in the study area to adjust supply in relation to demand in national markets.

**7.10 INSECT- PESTS ON POMEGRANTE:**

About 86 insect species are known to attack on pomegranate in the World, of which 47 have been reported from India (Kulkarni and Dethe, 2006). Similarly, Mote and et all (1992) also confirmed 53 insect species associated with pomegranate in the Maharashtra. Various research studies indicated a strong correlation between insect, pest, disease occurrences and weather parameters. In this context, the attempt has been made to analyze Bahar wise major insect pest problems faced by respondents.
An examination of table No.7.6 reveals that there are major 12 insect pests attacking on different parts of pomegranate trees. The soil born organism ‘root knot nematode’ damage roots of trees ultimately results in wilting (dying) of pomegranate trees. The main stem of trees was affected by ‘stem borers’ and lower parts of the trunk by ‘shot hole borer’. The ‘bark eating caterpillar’ feeds on the tough protective outer sheath of the trunks, branches and twigs of trees. The sucking insects’ aphids, white flies, thrips and scale insects survive on leaves, twigs and flowers of pomegranate. In fact, most problematic and economically important insects in the production of quality fruits are fruit borer, sucking moth, anar butterfly, mealy bugs and mites. The bark eating caterpillar (Inderbella) was the only insect-pests prevalent throughout the year (Kulkarni and Dethe, 2006). Whereas, owing to variation in weather conditions the maximum build up of the insect-pest has been reported in

Table No. 7.6 Problems of Insect-pest Infestation

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Insect - pest</th>
<th>Number of Respondents</th>
<th>Percent in Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Aambe</td>
<td>Hast</td>
</tr>
<tr>
<td>i</td>
<td>Thrips</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>ii</td>
<td>Anar butterfly</td>
<td>28</td>
<td>71</td>
</tr>
<tr>
<td>iii</td>
<td>White flies</td>
<td>179</td>
<td>71</td>
</tr>
<tr>
<td>iv</td>
<td>Mite</td>
<td>183</td>
<td>84</td>
</tr>
<tr>
<td>v</td>
<td>Mealy bugs</td>
<td>185</td>
<td>65</td>
</tr>
<tr>
<td>vi</td>
<td>Scale insects</td>
<td>179</td>
<td>71</td>
</tr>
<tr>
<td>vii</td>
<td>Fruit sucking moth</td>
<td>34</td>
<td>70</td>
</tr>
<tr>
<td>viii</td>
<td>Bark eating caterpillar</td>
<td>128</td>
<td>73</td>
</tr>
<tr>
<td>ix</td>
<td>Stem borer</td>
<td>50</td>
<td>76</td>
</tr>
<tr>
<td>x</td>
<td>Shot hole borer</td>
<td>76</td>
<td>42</td>
</tr>
<tr>
<td>xi</td>
<td>Root knot nematodes</td>
<td>55</td>
<td>73</td>
</tr>
<tr>
<td>xii</td>
<td>Aphids</td>
<td>43</td>
<td>92</td>
</tr>
</tbody>
</table>

(Source: Compiled by researcher)
rainy season or Mrig Bahar. And moderate incidence was noticed in winter or Hast Bahar while the least infestation was found in summer or Aambe Bahar.

i) **Mrig Bahar** (June - Oct):

It can be observed from table No.7.6 that half of insect pests viz. thrips, anar butterfly, fruit sucking moth, stem borer, shot hole borer and root knot nematode recorded maximum build up during Mrig Bahar. The study conducted by Kulkarni and Dethe (2006) also concluded that during rainy season the pest attack increases fastly due to congenial weather conditions like high humidity and moderate temperature, which favours population growth of insect pests.

ii) **Hast Bahar** (Oct - Feb):

This Bahar coinciding with winter season is known for mild daytime temperature causes moderate attacks of insect pests namely thrips, mealy bugs, white flies, mites, anar butterfly, fruit sucking moth, stem borer and root knot nematode. Kotikal and et all (2009) correlated weather parameters with seasonal incidences of sucking pests (aphids, white flies, thrips). They noted that high morning relative humidity in winter increases population of sucking pests in next two weeks.

iii) **Aamber Bahar** (Feb - Jun):

Dry weather i.e. high temperature combined with low relative humidity in summer restricts the population growth of many insect pests. But warm weather favoured maximum incidences of white fly, mite, mealy bugs and scale insects in Aambe Bahar. These insect pests have positive correlation with temperature hence abundant during Aambe Bahar (Shewale 1994).

**7.11 DISEASES ON POMEGRANATE:**

These insect pests not only inflict moderate to heavy losses but also responsible for the spread of bacterial, fungal and viral pathogens causing various infectious diseases like leaf and fruit spots, fruit rots and root rots etc. As a consequence of the detrimental effects, there was a decline in area, production, and productivity of pomegranate in different parts of the study area. The sustainable pomegranate production is possible only if the insect, pests and diseases are managed properly and kept under check (Jadhav and Sharma 2009).
Appendix-IX shows that there are 31 fungal and 1 bacterial pathogens found in India causing various diseases to pomegranate trees. In total 32 pathogens having particular names (genus and species) and half of them have ability to damage at least any two parts i.e. leaves, fruit and roots of trees. The nature and extent of damage not only depends on the particular type of pathogen but also the intensity and severity of attack. A single pathogen if not controlled can ruin the total yields of pomegranate crop. For instance, Alternaria Alternata and Phytophthora Nicotianae pathogen infection starts with the appearance of minute dark coloured spots then leaves shed off or fallen off. As the severity increases i.e. damaging stage leads to brown or black spots on fruits. Further severity results in secondary infections causes rotting of fruits.

Looking into Appendix-IX, it is clear that for the lowly literate grower; it would be difficult to identify the particular pathogen infested to their orchard. Since most of pathogens show similar symptoms. But respondents were clear to express the damages like leaf, fruit rots, root rots, blight etc. (table No.7.7) caused to the orchards.

### Table No. 7. 7 Problems of Diseases Infestation

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of disease</th>
<th>No. of respondents</th>
<th>Percent to total</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Leaf spots and rots</td>
<td>225</td>
<td>49.55%</td>
</tr>
<tr>
<td>ii</td>
<td>Fruit spots</td>
<td>284</td>
<td>62.56 %</td>
</tr>
<tr>
<td>iii</td>
<td>Fruit rot</td>
<td>211</td>
<td>46.48 %</td>
</tr>
<tr>
<td>iv</td>
<td>Wilt (root rot &amp; stem canker)</td>
<td>327</td>
<td>72.34 %</td>
</tr>
<tr>
<td>v</td>
<td>Bacterial blight or oily spot</td>
<td>126</td>
<td>27.75 %</td>
</tr>
</tbody>
</table>

(Source: Compiled by researcher)

i) **Leaf spots and rots:**

Leaves can be infected by total 12 fungal pathogens. The diseases on leaves like spots, blights and afterwards falling off were reported by 49.55%. The small, regular to irregular brownish to black spot were developed on the leaves. These spots sometimes coalesce to form large patches. As the severity of the disease increases affected leaves turn full black and fallen off prematurely known as ‘defoliation’. It also limits the growth of new leaves, buds, flowers and twigs, etc.
ii) **Fruit Spots:**

The fruits are the most vulnerable part of pomegranate trees i.e. more prone to attacks of insect pests and diseases. Therefore, during Bahar period it requires careful diagnosis and timely handling to protect the crops from heavy losses. Total 15 pathogens are known to attack on pomegranate fruits. Infestation of fungal pathogens causes small to large size spots of brown to black in colour on the skin of fruits. The quality of fruits both matured and half matured was considerably reduced. Such fruits though edible and sweeter in taste but blemished skin lack in appearance and fetch low prices in the market. About 62.56% respondents suffered from fruit spot diseases.

iii) **Fruit Rot:**

The fruits are only valuable part of pomegranate tree, in other words, rotting of fruits is an economically unbearable disease. The decaying of fruits is characterized by softening of the skin, underneath pulp and the seeds. After complete rotting the entire fruit turn brown to black in color. The respondents to the extent of 46.48% suffered from rotting or decaying of pomegranate fruits.

According to Waskar (2006) decay usually starts at the calyx of fruit and as it progresses, the skin becomes light brown and leathery. In advance infections the pulp bearing seeds disintegrate into a dark black mass. Fungal infection also takes place at fruit skin breaks caused by cracking, mechanical injuries or insect punctures. The infested fruits totally become unfit for marketing and consumption.

With the expansion and intensive cultivation of pomegranate crop, the number of fungal as well as bacterial diseases has also been reported from different parts of the study area.

A few years back the diseases like ‘bacterial blight’ and ‘pomegranate wilt’ were practically unknown to the growers. But today, they are reported as serious problems and the main challenges for every pomegranate concern because the perfect remedy to eradicate them is yet unknown to anybody. It hampered the pomegranate production all over Maharashtra and Karnataka state. Owing to continuous and enormous yield losses some growers were cutting off or uprooted their orchards, so also threatened upcoming pomegranate cultivation in the study area. The boon commercial fruit crop to the growers turned as big bane after the severe attacks of these diseases. In context to this, the following section was essentially planned to highlight the details of these two devastating diseases.
7.11.1 Pomegranate Wilt Disease:

It is also known as decline of pomegranate, which refers to dying of pomegranate trees. It was firstly noticed in Karnataka during 1988 in Kanamadi and Kaladagi areas on a soft seeded Ganesh variety (Somasekhara 2006). The wilting plants were commonly seen during the field survey. The various types of wilt symptoms were observed like yellowing of leaves in a single branch, vertical stem cracking and blue stain patches on the bark. The disease appears firstly as yellowing and dropping of leaves on one or more branches of the tree. Then it takes a few days to two months for complete dying or wilting of the affected tree.

Causes:

The pomegranate decline is a complex disease due to the association of an abiotic factor like poorly drained heavy soils and the biotic factor consisting infestation of both pests as well as fungal pathogens.

- ‘Fusarium Solari’ causing root rot and ‘Rhizoctonia Batanicola’ causing collar or bark rot (Appendix-IX) are main pathogens progress the dying of the branches from apex towards the main stem. Hence it is also called as ‘die-back of pomegranate’. The wilt pathogens enter in stem through holes caused by insect ‘shot hole borer’ leading to stem canker of tree. Similarly, root wounds caused by insect ‘root knot nematodes’ helps to enter ‘Fusarium Oxysporium’ pathogen into the roots causes decay of roots (Navale 2006). These pathogens are soil borne and survive in the infected plant parts up to 190 days and in the soil for a long time.

- Though pathogens are primary causal agents for wilt but heavy soils with poor drainage and close plant spacing is other contributing factors for rapid disease built up (Jadhav and Sharma 2009). In addition, the infected seedlings, budding knife, secature, root contact implements are major sources for the spread of diseases (Jamadar and et. al. 2009).

Effect:

Sampled growers stated that the pomegranate wilt disease was practically unknown to them up to the year 2000. It slowly spread in pomegranate pockets
with increased severity after 2005. The primary data analysis indicated that wilt disease was prevalent 72.34% orchards. The wilt severity in surveyed orchards ranged from 5% to 50%. The sampled villages noticed with less incidence were namely Wakhari, Pokhari, Sakore in Nandgaon tehsil, Mesankhede, Kundalgaon, Daregaon in Chandwad tehsil, Rayate, Dhulgaon, Neurgaon in Yeola tehsil, Dongargaon, Nandgaon (De) in Niphad tehsil, Shaha, Pathare, Panchale and Rampur in Sinnar tehsil. In contrast, the villages namely Pilkos, Bagadu, Dahyane in Kalwan tehsil recorded moderate incidences. But all sampled orchards in the high concentration zone of pomegranate (Malegaon, Satana and Deola tehsil) revealed maximum infestation of wilting or dying.

Severely affected respondents (15%) stated that cultivation of this fruit crop became totally uneconomical. The productivity per unit of land significantly declined since more than 50% trees died due to wilt infection. Again there was threat of infection to remaining trees in the orchard. Rather than taking any financial risk, making expenses on protection from disease, the growers decided to cut off the orchards. Affected orchards were in fruit bearing stage so huge financial investments made on orchard establishment as well as on disease prevention were totally wasted.

**Remedies:**

The pomegranate growers adopted all sorts of measure to control wilt disease. Mostly the efforts were based on applications pesticides and fungicides developed by private companies. The spray schedules recommended by MPKV, Rahuri were also followed to manage wilt disease. Despite making all possible efforts, the complex of disease was still prevalent in the field.

**7.11.2 Bacterial Blight Disease (B.B.D.):**

The pomegranate growers are facing challenges one after another. Earlier the problem of wilt disease was a big menace, then growers were trying hard to solve the killer problem of bacterial blight disease (hereafter called as B.B.D.) on pomegranate. Still to date control measures are not found to eradicate this disease completely. It was found as main obstacle in further development of pomegranate cultivation. The
reports of bacterial blight occurrence in India are broadly emphasized by Jadhav and Sharma (2009) and concluded that B.B.D. is as old as (1952) pomegranate cultivation in India. Yet today it was most studied pomegranate disease in India.

However, a disease of less economic importance posed its outbreak severity in the year 2001-02 at Bijapur and Bellary districts of Northern Karnataka. Afterwards the epidemic spread of B.B.D. also extended in border districts Solapur, Sangali as well as in other pomegranate areas of Maharashtra (Yenjarappa and et. al. 2006). It ruined the pomegranate orchards on a large scale and resulted in enormous losses to the growers valued into crores of rupees.

Causes:

The bacterial pathogen ‘Xanthomonas Axanopodis pv. Punicae’ is the casual organism responsible for this disease infection. Initially brown to black spots with an oily appearance appears on leaves and fruit, therefore, it is also known as ‘Oily Spot Disease’. This disease remains prevalent in mild to moderate form throughout year at 9° to 43° C temp. and also at lower humidity but become more severe under humid conditions (> 80 %) and moderate temperature (25° to 35°C) during the rainy season (Jadhav and Sharma 2009).

It other words, above pathogen is known to survive on the infected plant in resident phase throughout the year till environmental conditions become congenial for its re-occurrence. Once the field is infected, then it is difficult to control and eradicate the disease completely hence causes epidemic in the pomegranate growing area. The growers were also unable to state the root cause of infection of the disease to their orchard. The bacterial pathogen survives in infected plant debris e.g. fallen leaves and fruits during off-season and spreads through planting material, cutting secateurs and wind splashed rains.

As far as study area is concerned, the B. B. D was firstly noticed in 2006 at few orchards in the Vajgaon- Kharda village of Deola tehsil. Even though Ruby pomegranate variety is not recommended in agro-climatic conditions of Maharashtra but in search of something new, few growers brought uncertified plants of this variety from Karnataka in the year 2005. Those plants were B. B.
D. infected. Soon after planting, the disease started to build up under favourable environmental conditions. It was found the basic source or root cause of B. B. D. infection in the study area. Later it spread in major pomegranate growing Deola, Satana and Malegaon tehsils. Now B. B. D. is common and usual disease found everywhere in the study area.

**Effects:**

Affected sample growers explained that the initial infection started firstly on leaves with the oily appearance of minute, irregular spots with few trees later it turned to dark brown or black spots. Then leaves turned brown to black and dropped off. Secondly the fruit infection was the most damaging stage of B. B. D. Usually it attacks in the early fruiting stage or when fruits are half grown. Appearance of oily spots on skin of fruits is the major symptom. Affected fruit skin became hard that looses the elasticity or softness that causes ‘L’ or ‘Y’ shaped cracks in fruits. Finally, the bacterial pathogen also enters inside through cracks leading to rotting of the entire fruit. The rotted fruits turn black to brown in colour. Hence they became unfit for consumption and marketing.

B.B.D is capable to damage entire orchard within 15 - 30 days. During the field survey, the fruits were often seen in the form of dark brown to black fruit mummies scattered on the floor of severely affected orchards and a few of them hanging over the trees. In this case, trees appeared weak that would be leading on the way of dying in a few days.

The respondents to the extent of 27.75% were affected this disease. And the damages significantly varied from one orchard to another depending on severity of infection as attempted in the table No. 7.8.
Table No. 7. 8 Distributions of B. B. D. Affected Respondents According to Yield Loss

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Nature of Yield Loss</th>
<th>Number of Respondents</th>
<th>% to Total Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Firstly some infected fruits were destructed</td>
<td>11</td>
<td>2.42</td>
</tr>
<tr>
<td>ii</td>
<td>Plucked and sold out half grown fruits</td>
<td>08</td>
<td>1.76</td>
</tr>
<tr>
<td>iii</td>
<td>25 - 50 % of yield losses (fruits rotted)</td>
<td>19</td>
<td>4.18</td>
</tr>
<tr>
<td>iv</td>
<td>More than 50 % yield losses (fruits rotted)</td>
<td>13</td>
<td>2.86</td>
</tr>
<tr>
<td>v</td>
<td>100 % yield losses</td>
<td>17</td>
<td>3.74</td>
</tr>
<tr>
<td>vi</td>
<td>Continuously last 2 Bahars infected or failed</td>
<td>06</td>
<td>1.32</td>
</tr>
<tr>
<td>vii</td>
<td>New plantations affected</td>
<td>04</td>
<td>0.08</td>
</tr>
<tr>
<td>viii</td>
<td>Threatened hence Bahar not practiced</td>
<td>14</td>
<td>3.08</td>
</tr>
<tr>
<td>ix</td>
<td>Thinking to cut off the orchards</td>
<td>13</td>
<td>2.86</td>
</tr>
<tr>
<td>x</td>
<td>Uprooted half of the orchard</td>
<td>21</td>
<td>4.63</td>
</tr>
<tr>
<td></td>
<td>Total affected respondents</td>
<td>126</td>
<td>27.75 %</td>
</tr>
</tbody>
</table>

(Source: Compiled by researcher)

Above table amply clear that because of B. B. D. attacks pomegranate cultivation became totally uneconomical and as far as possible the growers adopted following remedies to mitigate this disease problem.

**Remedies Adopted By Growers:**

i. At the first, when occurrence of B. B. D. was noticed on smaller proportion, 2.42% respondents plucked and burnt infected fruits to avoid further infection. About 1.76% respondents harvested and sold half grown infected fruits at very low prices in local markets to compensate the production expenses.

ii. In case of severe infections, 3.74% respondents reported caused total loss or zero output in the surveyed year. The large masses of rotted fruits were thrown away or burnt at barren places to avoid infection for the next cropping season. The growers usually felt that the B. B. D. spreads from the neighbor’s field.
iii. About 0.08% growers changed the variety and place of orchards but new plantations were also not free from this disease.

iv. Rainy season (Mrig Bahar) provides congenial weather conditions recording maximum intensity. Therefore, 1.32% growers shifted towards Hasta and Aambe Bahars of minimum intensity. But the disease was prevailed in the field so about 3.08% respondents were threatened and did not practice any Bahar.

v. Pomegranate growers lost their quality fruit production. For instance, owing to the fact of unbearable financial losses 4.63% respondents uprooted their half of the orchards recently. While 2.86% respondents were not ready to any more risk and firmly stated to cut off the orchards.

vi. The respondents told that a few years back, every day 7 to 10 trucks of pomegranate fruits were loaded from reputed pomegranate villages namely Dabhadi, Satmane, Aghar, Chinchwad, Talwade in Malegaon tehsil and Chougaon, Vaygaon, Pofir, Kotbel in Baglan tehsil, Vajgaon- Kharda, Dahiwad in Deola tehsil of study area. As well as nearly ¾th cultivated area in above villages was under pomegranate. But recently the infestation of wilt and B. B. D. ruined the pomegranate crop on a large scale. Consequently, the area under a pomegranate declined to 40 - 50% in the study area.

Among different management strategies to control the disease, the application of chemical sprays was at the first priority. The growers were found to depend mostly on the agro-service centres (input dealers or private company agents) for the suggestion. Obviously, it was skewed in the favour of their business. Even after applying very powerful antibiotic, there were no positive results. Now, there is growing realization among growers that B.B.D cannot be eradicated by the application of chemicals in vogue.

In a nutshell, B. B. D. had put up pomegranate growers in harsh financial crisis. They were not only thinking of crop diversification but few of them already started to cultivate other cash crops like onions and maize in order to save their livelihood and economy dependant on agriculture.
Mismanagement of Pomegranate Farms on Behalf Grower:

Apart from the initial infections, the unawareness and mismanagement of pomegranate farms on behalf of growers is also responsible for the wide spread insect-pest and diseases attacks in the study area.

i) Monoculture:

The pomegranate was a major fruit crop cultivated in almost 80% villages of Malegaon, Satana and Deola tehsils of the study region from 1991. It formed a unique type of agro-ecosystem can be called as ‘Pomegranate Agro-Ecosystem’. It means that same crop was cultivated in the same field from previous two decades leading to monoculture or uniculture. Monoculture practice was further promoted by growing only ‘Bhagawa’ pomegranate variety, which covered 75% area under cultivation. Because of late maturity period this variety is more prone to B. B. D. Thus, absence of crop diversification in agriculture promoted attacks of pest-diseases on pomegranate.

ii) Uncertified planting material:

The disease starts to build-up soon after planting of infected saplings. Although certified but local or private nurseries often lack in guarantee of disease infection. Because of matter of purity about 64.23% respondents didn’t preferred the saplings offered under the EGS subsidy scheme. Hence, saplings produced by plant ‘tissue culture technique’ at MPKV Rahuri and Jain Irrigation, Jalgaon (M.S.) are disease free and guaranteed of originality for variety are suggested for planting.

iii) Short plantation distances:

As stated earlier, growers have a general tendency to adopt smaller distances thereby accommodating a number of plants per unit area for getting maximum yields. Such densely populated orchards become overcrowded or congested consequently restrict natural air circulation, sunlight penetration and soil aeration. Artificially, humid conditions are provided for building up of insect, pest and diseases. Looking into the future growth of trees and healthy survival of pomegranate orchards MPKV, Rahuri has recommended planting distance of 14 X 12 feet for light and medium soils and 15 X 15 feet for heavy soils.

iv) Gestation period:

The scientists of MPKV, Rahuri recommended 2½ year gestation (waiting) period for first harvest after the plantation of the orchard. However, growers do not
wait for a long time. Primary data revealed that 28.76% sample growers adopted the first Bahar after 1½ year and 52.88% after 2 years of planting. This practice of short gestation period makes plant weak having low resistant capacity against disease.

v) **Intercropping:**

The intercrops like onions, vegetables, gram etc. are commonly practiced to generate additional income during initial years of planting. But growers mainly concentrated on intercrops and individual pomegranate trees were not properly cared during this unproductive phase of orchard or supplied with fertilizers. It results into under the nutrition of trees and hinders sustainable growth of orchard trees.

vi) **Short rest period:**

Only one Bahar in the year and rest period of 5 - 6 months between the two harvests is recommended for pomegranate orchards despite that 4.17% respondents practiced 2 Bahars in a year. It may be due to greed of individual grower or adverse environmental factors like water shortages etc. This cultural practice of ‘short crop rest period’ also makes orchard trees weak and more susceptible to pest disease attacks. So the growers should not only consider short term profits but also fairly look toward healthy survival and long term benefits from orchards.

vii) **Lack of clean cultivation practices:**

Growers are generally unaware of the significance of field sanitation for completely eradicating the life cycle of pests, diseases. The clean cultivation practices refer to both field and tree cleaning. The field clear out includes destruction of weeds, diseased leaves and fallen fruits on the orchard floor. And tree cleaning consists removal of dry rotted, diseased twigs and branches, unwanted vegetative growth, off season flowers, fruits, treating the stems with Bordeaux paste etc. Negligence of these practices favour survival of insects and pathogens for longer period in the orchard and builds up heavy inoculums, whenever a congenial environmental condition prevails.

viii) **Use of infected pruning scissors:**

Pruning scissors are owned by labour employed for this operation. Once the scissors are used in the disease affected orchard, it becomes a major source of infection for other health fields. Therefore, it is necessary to disinfect the pruning scissors with chemical ‘Sodium Hydrochloride’ after every cut and tree. However, both labours and growers neglect such precautionary measures.
ix) **Unable to identify insect pest and diseases:**

The growers are confused and unable to identify or differentiate between pests, fungal and bacterial diseases. It leads to the utilization of improper chemicals and spray schedules. For instance, the infection symptoms of B. B. D. (spots on leaves and fruits) are similar to other fungal pathogen namely cercospora and collectotrichum. Thus, growers spray fungicide in spite of bactericide that leads to ‘non targeted control’, which in turn increases severity of pest and diseases and also kills other helpful organisms in agro-environment like pollinating insects, bees etc.

x) **Frequent and unnecessary spraying:**

Frequent spraying result in deposition of water drops and chemicals on different parts of the tree so there is a probability of more infection under wet conditions. Besides it also increases resistant capacity of pest or pathogen against particular antibiotics, further it needs high power antibiotic or chemicals to kill. Thus overuse of chemicals not only increased production costs but also caused several detrimental effects e. g. chemical residues in fruit, agricultural pollution etc.

xi) **Improper fertilizer management:**

Low use of organic fertilizers and unawareness of the recommended doses, type, time and method of fertilizers results in unbalanced nutrient supply. It hinders proper growth of trees possessing low resistant capacity against the attacks of pest and disease. Therefore, it is expected to develop ‘inbuilt resistance’ in pomegranate trees through ‘integrated nutrient management’ based on soil testing and leaf-tissue diagnosis reports before and after cropping season.

In a nutshell, above discussion clears that growers do not follow the recommendations given by scientists of Mahatma Phule Krishi Vidyapeeth (MPKV) Rahuri and National Research Centre on Pomegranate (NRCP), Solapur (MS).

**Efforts of Government:**

i. Looking into the epidemic spread of disease, ICAR constituted the expert committee in 2006 consisting of scientist from Maharashtra viz. NRCP, (Solapur), MPKV (Rahuri), Directorate of plant protection (Nagpur) and UAS (Dharwad), IIHR (Bangalore) from Karnataka to assess the actual damage due to wilt and blight disease in Maharashtra. The committee submitted detailed reports on epidemiology, symptoms and causes of the disease.
ii. In addition, several meetings of scientists, agriculture officials and progressive growers from different states were called together by the ICAR. Finally, committee formulated package of Good Management Practices (GMP) to mitigate the disease problems on pomegranate (Jadhav and Sharma 2009).

iii. Provided that the monoculture can’t be avoided but collective efforts and community based approach like “One village - One Bahar” (like kharip and rabbi cropping season) is suggested by experts to eradicate the disease completely. So that simultaneous and integrated efforts for pest disease management like uniform spray schedules, cleaning of all fields and trees, bourdoux pasting, concurrent post harvest care etc. would help to prevent infection in a neighbor’s field. Likewise, Good Agriculture Practices (GAP) adopted by all growers or at least by a group of growers in certain parts of the village will also minimize the population of insect pests.

iv. In 2008 agriculture department (GoM) encouraged pomegranate growers in controlling the diseases by implementing a training program named as ‘Farmers School’ in each affected village having at least 30 participants in the school. The sole intention of this school was to bring awareness and build up capabilities of growers for effective control of diseases by adopting Good Management Practices (GMP) on a community basis. The local experts were weekly invited to carry out field demonstrations in front of growers.

v. The financial assistance ₹ 50000 ha⁻¹ to all pomegranate growers were provided in 2009 for purchasing inputs towards rejuvenating their wilt and blight disease affected orchards.

Effort of Private Pesticide Company:

It is worth mentioning that, the ‘Maharashtra’s Largest Pomegranate Exhibition - Dalimb 2010’ was organized by Poorva Chem-tech Private Limited in association with Maharashtra Pomegranate Growers Research Organization during 1st to 4th September 2010 at Malegaon tehsil (Dist. Nashik). Of course, it was a unique opportunity for me to share the thoughts of all pomegranate concerns by actively participating in this exhibition held at my native place. The notes were prepared during the seminar, which helped to write some facts in the present thesis.
This four day program was aimed to provide strong motivational forces, more mass media exposure and extension contact for growers.

i. About 566 pomegranate growers took part in fruit quality competition. Based on parameters i.e. weight, colour, size, grain size the quality of fruit was assessed by experts. And prizes (trophies) were honoured to motivate pomegranate growers for quality production.

ii. More than 4000 pomegranate growers from all over the state were gathered together in one day seminar. Their representatives expressed the practical experiences, constraints, problems about the cultural practices and expectations from pomegranate institutions. Indeed, presence of pomegranate scientists from MPKV namely Dr. Raghuwanshi, Dr. Supe, Dr. Kulkarni and Dr. A. B. Patil from Jain Irrigation System Ltd. were the resource persons, who made the exhibition more meaningful by providing valuable suggestion and recommendations by open discussion with participant growers.

iii. The success story of 38 pomegranate growers from the study area, who conquered the blight and wilt disease and obtained good yields, was demonstrated in their own words. Additionally, total 20 laminated posters describing the good agricultural practices (GAP) for pomegranate crop were displayed.

Briefly, this exhibition was an eye opener to the growers. It indicated the adoption of recommended practices became more imperative in pomegranate farming during recent time. It engaged the growers mind to think more scientifically that how the crop will survive, if they will not follow the recommendations?

Suggestions:

i) The scientists are of view that it is the need of the day to make an integrated approach involving each player of pomegranate value chain from plantation up to marketing (viz. nursery holders, agri-input suppliers, growers, middleman, harvesting contractors, labours, transporters, agro-chemical companies, government agri. officials, pomegranate consultants and scientists) for mitigating the problem of wilt and blight diseases. It will definitely work to build up the confidence among the growers to save the rural economy based on pomegranate farming.
ii) The progressive pomegranate growers opined that the financial package for bacterial blight and wilt disease control given by government is nothing but pouring of extra funds and amalgamation of existing subsidy schemes. Because pomegranates yield losses due to above diseases are many times higher than subsidy amounts. No proper techniques or ideas were given to solve the problem; evidently all existing measures to control the disease were failed. Therefore, they suggested that rather than giving financial help to the growers, the funds should be diverted to research development on ‘Bacterial Blight Disease Resistant Variety’ and subsequent extension activities like ‘Pomegranate Disease Diagnostic Centre’ and installation of a weather station in pomegranate growing regions.

iii) The funds could also be provided to pomegranate linked NGO’S, those possess well research infrastructure (biotechnological labs) such as Jain Irrigation System, Jalgaon (M.S.). According to company authorities, the biotechnological lab of the company is single most in India accredited at national level having NABL certification (National Accreditation of Board for Testing and Calibration Laboratory).

iv) In my opinion the mixed fruit orchard; those are practiced in Iran, U. S. A. countries will also help to minimize the problem of monoculture. The pomegranates can be planted with any other hardy fruit plants (suitable in drought prone regions) like ber, amla, custard apple, mango etc. in alternate rows or between trees. It will generate additional income to growers as well as minimize the risk of total economic losses due to b. b. d. attacks on pomegranate.

7.12 THRUST AREAS OF RESEARCH ON POMEGRANATE:

Looking into the hazardous nature of both diseases, research efforts are immediately required to sustain the pomegranate farming in study area.

7.12.1 Disease Resistant Variety of Pomegranate:

Pomegranate growers are largely demanding the disease resistant variety that has not been yet developed by research institutions. It could be only pesticide free, cost effective and environmentally safe solution for disease control. The sad part of existing Indian pomegranate varieties is that all are prone to above devastating
diseases. Among all the problems in pomegranate cultivation non availability of bacterial blight and wilt disease resistant variety ranked at the first place.

Since from last 10 years, not a single variety have been released by any of the institution working on pomegranate (Indian Institute of Horticulture Research (IIHR - Banglore), Mahatma Phule Krishi Vidyapeeth (MPKV- Rahuri), University of Agriculture Sciences (UAS- Dharwad) and National Research Centre on Pomegranate (NRCP - Solapur). The research progress is underachieved in this direction and this issue needs particular attention.

Therefore, development of wilt and blight disease resistant variety must receive centre stage in prioritization of pomegranate research programs. The success can be achieved by exploring wild pomegranate genetic resources and with the help of biotechnological tools such as molecular breeding, cloning of plants and micro-propagation. Although 35 commercially cultivated, in addition, wild pomegranate varieties are found in India but this genetic variation is not yet fully exploited Somasekhar (2006).

It is not the matter of only disease resistant but the suitable agro-environmental conditions should also be there for growth of innovated variety. Growers expect that the new high yielding variety shall be hybridized having good physico-chemical traits like bright colour, shape, size and taste for consumer preference in the market.

7.12.2 Sub-research Centre on Pomegranate:

Considering the huge production potentials of the study region, the ‘Pomegranate Sub-research Centre’ by Mahatma Phule Krishi Vidyapeeth, Rahuri had recently established in 2012 at village Lakhmapur (Satana Tehsil, Dist: Nashik, M S). The Centre has under its jurisdiction 27.4 ha of agricultural land for the field experiments. The construction work of buildings (Admin Office, laboratories and staff quarters) was found in progress during my personal visit to the location.

Especially the young generation of growers was eagerly waiting for full execution of this centre with the intention that they can learn scientific techniques of cultivation at their doorstep. Officials would provide strong motivational forces and act as an extension agency for adoption of improved practices. In true sense, the centre must take steps for lab-to-land extension of pomegranate technology.
7.12.3 Weather Station:

It would be essentially installed at the experimental farms of above sub-research centre to monitor the meteorological data i.e. rainfall, temperature, humidity, evaporation, wind velocity. This data could be used for two purposes.

a) The life cycles of insect pest, their population and disease occurrences reveal strong correlations with weather parameters. Thus the ‘insect pest and disease forecast model’ for pomegranate could be developed by epidemiologists. Based on this model, research centre staff or any others would predict favourable weather conditions for a particular disease in advance. And growers will be enabled to adopt preventive measures since it is commonly known that ‘prevention is better than cure’ or ‘stitch in time saves nine’.

b) In view of the greatest problem of water shortages, the temperature, pan evaporation, humidity, rainfall data can be useful for formulating irrigation schedules of the pomegranate crop in the study region. The researchers could calculate the (daily / weekly / monthly / season) specific water requirement. And the growers will get proper information on how much amount of water supplied through drip irrigation.

7.12.4 Pomegranate Disease Diagnostic Centre:

As stated earlier, many growers are unable to identify and differentiate insect, pests and diseases on pomegranate crop. Therefore, the pomegranate disease diagnostic facility would be made available on the same premises of the sub research centre. It will enable growers to adopt proper control measures to check infestation at the right time.

Overall, the analysis of the problem and constraints in pomegranate cultivation in this chapter accepts the fourth declarative hypothesis. The growers are suffering from some minor and major problems that recently hampered the pomegranate cultivation of the study area. Besides the economical considerations, some ecological, epidemiological and practical marketing problems had been evolved in pomegranate farming.