



Foreword

This report is one of the series of reports on kitchen items including Potato, Onion, Tomato, Chili and Garlic, prepared on the direction of Mr. Fayyaz Bashir, Secretary Agriculture, Punjab, to identify problems prevailing in the supply chain of these items of daily use. The national data has been sorted out and comparison is made with the international situation to assess the gap. Secretary agriculture has been kind enough to spare time to discuss these reports in detail.

Pakistan annually produces about 4.2 million tons of tomato. The agro-ecological diversity in the country enables production of tomato almost around the area. Despite of this price pendulum remains swinging between extremes owing to various factors. The most important among these is the perishable nature of both its plant and fruit. High temperature is very detrimental to its shelf life. The lowest prices at the time of bumper production worked as disincentive for the growers to increase its area. Tomato production is increasing but at yield front Pakistan is lagging far behind the world average. Increase in per acre yield of tomatoes in Pakistan is dire need of the hour. The introduction of tunnel technology and hybrid seed are required to enhance yield and lengthen the production period. The value addition in tomatoes can help to even out its prices. Harvest and post harvest management can also bring positive changes.

The suggestions to overcome different constraints and bottlenecks in supply chain are only indicative; detail measures can be refined and fine tuned the experts in relevant field.

Efforts of Dr. Sofia Anwar and Mr. Muhammad Irfan Bhatti for collection and analysis of information for completion of this report are acknowledged.

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Interpretive Summary

In recent years tomato has become one of the most important vegetables produced world wide. Tomato is a familiar ingredient of salads. It is eaten fresh, fried, backed and adds both flavour and colour to soups, sauces and ketchups. The fruits are also canned, either whole or as tomato juice. Tomato is the most important crop in the world, with annual production approaching 33.14 million tons obtained from 3.42 million acre. World per capita tomato consumption has increased at a nominal rate during last five years; but increasing global population warrants increase in tomato production. Statistics show that world annual production is increasing but at a slower pace.

In Pakistan tomato is grown on an area of more than 102 thousand acres producing more than 4.2 million tons annually. Punjab Province contributes about 19% of the country production and NWFP is the major producer with the share of 45% in total production of the country. Pakistan stands at 30th number with respect to share in world production but at yield front it shows a gloomy picture and placed at 119th among the tomato producing countries. There is gigantic difference between per acre yield of Pakistan and other high yielding countries

Tomato prices show severe fluctuations which are both cyclical and seasonal. It is cheaper at the time of harvest in Punjab and the price goes up afterward. Similarly in some of the years when production is low prices are high and beyond the reach of consumer whereas in case of bumper crop prices are so low that the growers can not recover even their cost of production.

The Tomato Problem is Analyzed as Follows:

- Heavy price fluctuations.
- Low prices when harvesting of Punjab crop.
- Low and stagnating yield.
- Lack of value addition.

Suggestions to Regularize Supply and Prices

- In short run import from neighbouring countries.
- In long run Increase supply from Punjab.
- Tunnel production to enhance time period of supply.
- Improvement in farm management practices leading to better quality and more yields.
- Development of New high yielding varieties.
- Collection and dissemination of true market information.
- Timely release of area and production estimates.
- Introduction & Promotion of processing and value addition at small and medium level industry.





Early History

Tomatoes are probably one of the most popular summertime vegetables. It's a member of the nightshade family and is closely related to potatoes, peppers, and eggplant. The tomato is now grown worldwide for its edible fruits, with thousands of cultivars having been selected with varying fruit types, and for optimum growth in differing growing conditions. Cultivated tomatoes vary in size from cherry tomatoes, about the same 1-2 cm size as the wild tomato, up to beefsteak tomatoes 10 cm or more in diameter. The most widely grown commercial tomatoes tend to be in the 5-6 cm diameter range. Most cultivars produce red fruit; but a number of cultivars with yellow, orange, pink, purple, green, or white fruit are also available. Multicolored and striped fruit can also be quite striking. Tomatoes grown for canning are often elongated, 7-9 cm long and 4-5 cm diameter; they are known as plum tomatoes.

There are a great many tomato cultivars grown for various purposes. This section attempts a listing of some of the more common cultivars. Heirloom cultivars are becoming increasingly popular, particularly among home gardeners and organic producers, since they tend to produce more interesting and flavorful crops at the possible cost of some disease resistance. Hybrid plants remain common, however, since they tend to be heavier producers and sometimes combine unusual characteristics of heirloom tomatoes with the ruggedness of conventional commercial tomatoes.

Fruit or Vegetable?

Botanically speaking, a tomato is the ovary, together with its seeds, of a flowering plant, that is a fruit or, more precisely, a berry. However, from a culinary perspective, the tomato is not as sweet as those foodstuffs usually called fruits and it is typically served as part of a main course of a meal, as are other vegetables, rather than at dessert. As noted above, the term "vegetable" has no botanical meaning and is purely a culinary term.

This argument has led to actual legal implications in the United States, Australia and China. In 1887, U.S. tariff laws that imposed a duty on vegetables but not on fruits caused the tomato's status to become a matter of legal importance. The U.S. Supreme Court settled this controversy in 1893, declaring that the tomato is a vegetable, using the popular definition which classifies vegetable by use, that they are generally served with dinner and not dessert. The case is known as *Nix v. Hedden* (149 U.S. 304). Strictly speaking, the holding of the case applies only to the interpretation of the Tariff Act of March 3, 1883, and not much else. The court does not purport to reclassify tomato for botanical or for any other purpose other than paying a tax under a tariff act. However, the USDA also considers the tomato a vegetable.

But due to the scientific definition of a fruit and a vegetable, the tomato still remains a fruit when not dealing with tariffs. Nor is it the only culinary vegetable that is a botanical fruit: eggplants, cucumbers, and squashes of all kinds share the same ambiguity.



Varieties of Tomatoes

There are a great many tomato cultivars grown for various purposes. This section attempts a listing of some of the more common cultivars. Heirloom cultivars are becoming increasingly popular, particularly among home gardeners and organic producers, since they tend to produce more interesting and flavourful crops at the possible cost of some disease resistance. Hybrid plants remain common, however, since they tend to be heavier producers and sometimes combine unusual characteristics of heirloom tomatoes with the ruggedness of conventional commercial tomatoes. The most popular varieties are as under:

Beefsteak Tomatoes: Commonly known as the large fruited types, beefsteak tomatoes are capable of producing slice that covers a sandwich. The fruit from this variety of tomato plant can easily weigh two or more pounds and usually ripen late in season.





Cherry Tomatoes: Known to most as the small round tomatoes that accompanies garden salad, cherry tomato plant produces a “cherry sized” fruit, that can be a little larger than a cherry. These types of tomatoes range in size from the dwarf style tomato plant to the seven plus foot tomato plants. Typical cheery tomato plants produce excessively, so one plant per family is usually sufficient.

Determinate Tomato Plants: These tomato plants have similar habits of growing to a certain size, yielding the fruit and then declining. Plants within this category of tomatoes generally ripen early in the season commonly referred to as compact tomato plants.

Dwarf Tomato Plants: Also known as the midget or patio tomato plants, this variety of tomatoes produce cherry type tomatoes (1” diameter or less). Although these plants life cycle are short lived, they quickly produce tomato crops for a short period of time, due to hanging basket or small containers.

Indeterminate Tomato Plants: The most commonly grown tomato plants for the home gardener, typically these plants grow all summer long and will continue until cut back or killed off by frost or disease. The success of these tomato plants is very dependent on the use of tomato cages and stakes in order to promote a more natural growing environment and keep the fruit of this plant from coming into contact with the soil.

Paste Tomato: Less juicy than most varieties of tomatoes, the paste tomato plant offers a pear shaped fruit without a centre core. Paste tomatoes are known for their meaty insides and very few seeds, making this tomato plant an ideal canned good.

San Marzano Tomatoes: The ultimate tomato for making pasta sauce.

Globe Tomato: Another good slicer, this tomato is medium in size firm and juicy. It works well when used raw or cooked.

Green Tomato: Unripened tomatoes with a tart flavour, green tomatoes can be pickled, fried, made into relishes, jams, pies, breads, desserts, or baked in casseroles.

Pear Tomato: Pear shaped less juicy and flavour full than others, available in yellow red or orange colours. It is also used like cherry tomatoes i.e. eaten whole in salads and also used to make tomato paste.

Plum Tomato (Roma): More meaty and less juicy makes them perfect for quick cooking sauces, less juice to simmer away. Egg shaped and flavourful these are the tomatoes of choice in authentic Italian cuisines.

Modern Uses of Tomatoes

There's a wide variety of uses for tomatoes ranging from baking, boiling or grilling, raw in salads, soups, stews, casseroles, salsa, on sandwiches, and many others:

Tomato Paste: Concentrated tomatoes that have been cooked for hours before straining. Paste is used to thicken and fortify sauces and soups or stews. It can also be an intense flavour booster when spread thinly on bread or used as a pizza topping.

Tomato Ketchup: A thick, spicy or sweet tomato-based condiment often served with meat or used to flavour soups or casseroles.

Tomato Puree: Another great paste for pasta sauces, puree the thick liquid made from tomatoes that have been cooked for short time and strained.

Tomato Juice: Base for soups, casseroles, and beverages, tomato juice is cooked for a short time from fresh tomatoes before being pureed, strained and bottled or canned.





Stewed Tomatoes: Canned tomatoes which have been cooked with onions, celery, green salsa, salads, or fresh salsas.

Tomato Sauce: A thinner version of tomato puree, tomato sauce is a quick solution to fast pasta or pizza sauce, when herbs and onions or garlic are added and the sauce is heated to blend the flavours an oftenly requested ingredient soups, stews and casseroles.

Dried Tomatoes: These are sun dried tomatoes and like all dried foods are highly concentrated in flavour and chewy. They are either packed dry in cellophane to be used in hot liquid or packed in oil. Mostly used for flavouring soups sandwiches, stuffing, or pasta dishes, they also give body, when finely chopped, to sauces, functioning much like tomato paste.

Health Benefits of Tomato

Tomatoes are rich in vitamins and antioxidants. They are not acid forming ; contain a great deal of citric acid but are alkaline forming when enter the bloodstream. It increases the alkalinity of the blood and helps remove toxins especially uric acid from the system. As a liver cleanser tomatoes are wonderful especially when used with the green vegetable juices.

In many of sanitariums in Europe tomatoes are used as a poultice for various conditions in the body. There is a mistaken belief that tomatoes are not good for those who have rheumatism and gout. People with these conditions should mix tomato juice with other vegetable juices to avoid a recation that may be too strong.

Whenever the blood is found to be stagnant in any part of the body, a tomato poultice is wonderful as a treatment in removing that stagnation. It acts as a dissolving agent or solvent. They are best as blood cleanser and excellent in elimination diets. However they should not be used in excess on a regular basis.

Nutrional Facts (in one pound)

Tomatoes are a good source of vitamin C, fibber and potassium.

Calories	97.00
Proteins (g)	4.50
Carbohydrates (g)	17.70
Fiber	3.00
Fat (g)	0.90
Vitamin A (I.U)	4080
Ascorbic Acid	102.00
Potassium (mg)	273.00
Calcium (mg)	50.00
Iron (mg)	2.70
Riboflavin (mg)	0.15





Per Capita Consumption

gram/day

Sr. No.	Countries	2000	2001	2002	2003	2004
1	Greece	382	315	271	316	354
2	Tunisia	214	153	194	251	268
3	Egypt	247	225	236	231	258
4	United Arab Emirates	244	191	163	149	215
5	Turkey	221	209	233	235	209
6	Italy	214	150	116	181	201
7	Israel	163	128	139	140	182
8	Libyan Arab Jamahiriya	278	220	375	321	175
9	Romania	86	94	88	110	172
10	Malta	122	127	89	109	171
Sub Total:		217	181	190	204	221
135	Pakistan	5	5	5	5	7
Other 160 Countries		38	38	39	39	45
World Average		87	75	78	83	91

Source: FAO

World Cultivation of Tomato

It is estimated that annually about 11 million acres of tomato are cultivated all over the world. China and India contribute almost 40% of world tomato cultivation. The world market for tomato is expanding with the increase in global population. Therefore, dire need is to increase in the tomato cultivation. The world top ten countries by area cultivated and their share are given below:





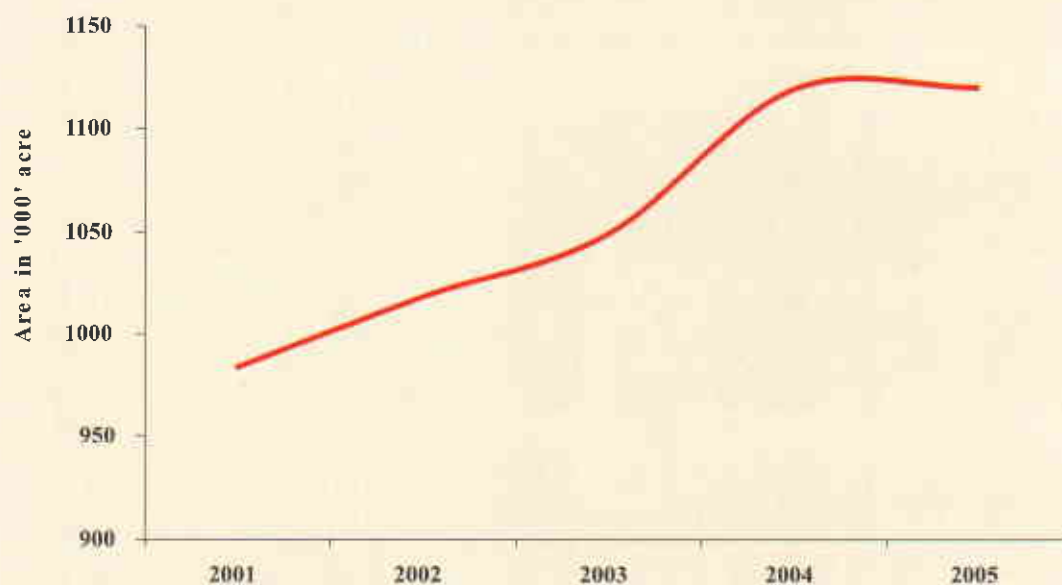
Per capita Consumption

Area in '000' acre

Sr. No.	Countries	2001	2002	2003	2004	2005	%age share
1	China	231	248	261	310	322	28.78
2	India	114	114	133	133	133	11.91
3	Turkey	56	63	64	63	64	5.73
4	Egypt	45	47	48	48	48	4.30
5	USA	40	44	42	43	41	3.68
6	Russian Federation	39	39	39	37	37	3.26
7	Italy	31	30	32	36	34	3.06
8	Iran	27	32	32	32	32	2.87
9	Nigeria	31	31	31	31	31	2.80
10	Ukraine	28	28	27	24	25	2.21
Sub Total:		641	677	709	758	769	68.59
20	Pakistan	7	7	8	10	10	0.91
Others150 Countries		336	334	333	352	342	30.49
World Total:		983	1018	1050	1120	1121	100.00

Source: FAO

Tomato Cultivation Trend in World





World Production of Tomato

It is estimated that annually about 122 million tons of tomato are produced all over the world. In many parts of the world it is staple food of the people. China and India contribute almost 25% of world tomato production. The world market for tomato is expanding with the increase in global population,

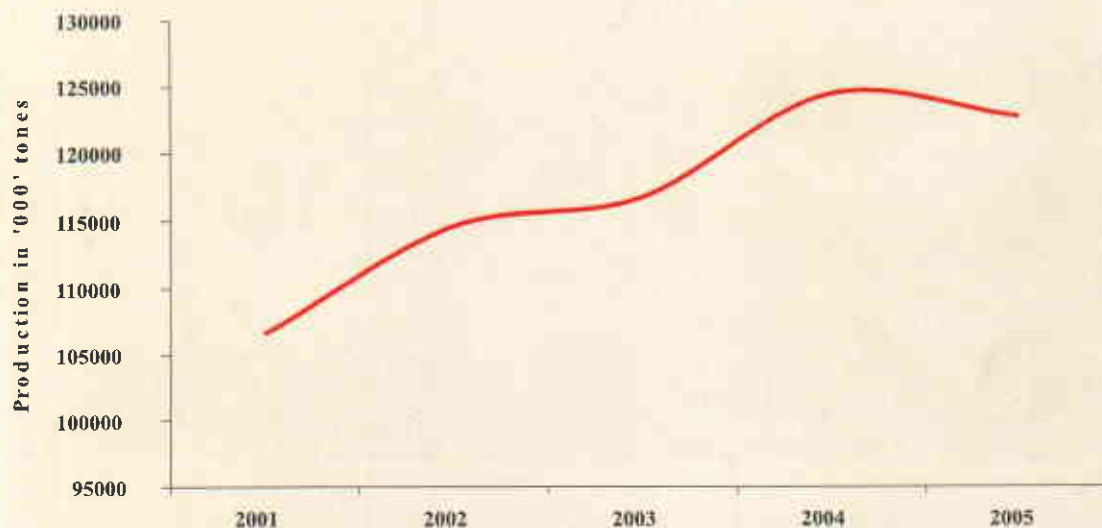
Production in 000 tones

Sr. No.	Countries	2001	2002	2003	2004	2005	%age share
1	China	24116	27153	28843	30144	31644	25.78
2	U.S.A.	10002	12383	10522	12867	11043	9.00
3	Turkey	8425	9450	9820	9440	9700	7.90
4	Egypt	6329	6778	7140	7641	7600	6.19
5	India	7240	7460	7600	7600	7600	6.19
6	Italy	6529	5750	6652	7683	7187	5.86
7	Spain	3972	3980	3947	4442	4474	3.64
8	Iran	3009	4109	4200	4200	4200	3.42
9	Brazil	3103	3653	3709	3516	3304	2.69
10	Mexico	2183	1990	2148	2148	2148	1.75
Sub Total:		74908	82706	84581	89680	88900	72.43
30	Pakistan	269	294	306	413	426	0.35
Others150 Countries		31429	31591	31869	34337	33412	27.22
World Total:		106605	114591	116756	124430	122738	100.00

Source: FAO

World Tomato Production Trend

World tomato production is steadily increasing. It has reached 122 million tones in 2005 from 106 million tones in 2001.





As for as tomato production is concerned China and United State both are standing in 1st and 2nd position respectively and Pakistan is at 30th position, Netherland and Belgium are 30th and 48th position in the whole world, but for yield the situation is not worth cheering about, Belgium Netherland are at 1st & 2nd position respectively and our position 119th in the community of 161 tomato producers.

Tomato Yield of Leading Countries

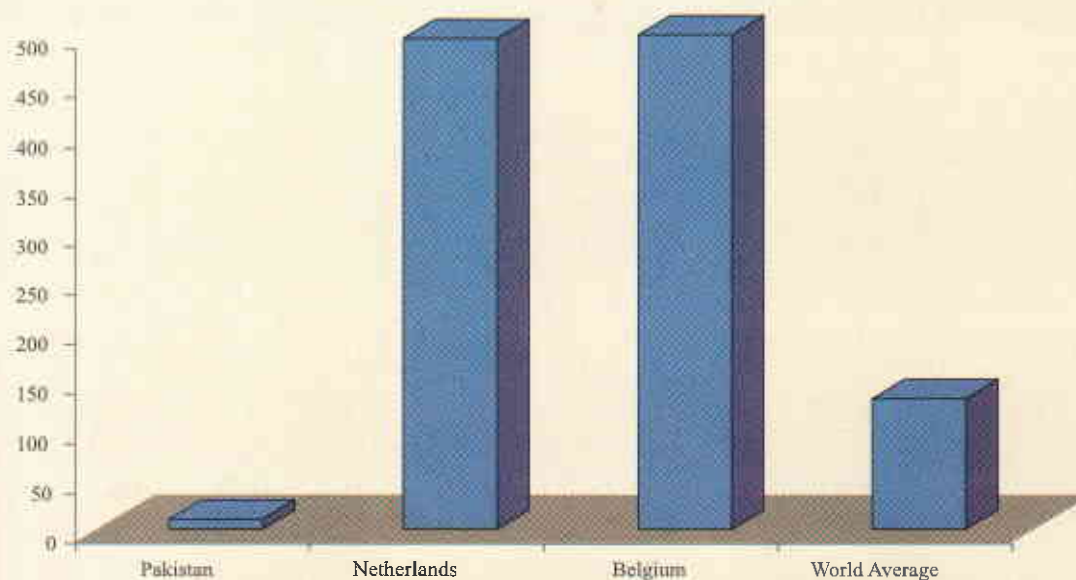
Tones/acre

Sr. No.	Countries	2001	2002	2003	2004	2005
1	Belgium	259	260	417	447	500
2	Netherlands	458	463	473	496	496
3	United Kingdom	210	210	168	411	411
4	Norway	351	302	284	269	405
5	Ireland	293	370	372	370	370
6	Sweden	342	356	356	380	352
7	Iceland	241	237	269	330	325
8	Finland	283	301	293	296	287
9	Austria	171	177	202	210	203
10	Denmark	210	200	197	200	200
Sub Average:		282	288	303	341	355
119	Pakistan	10	10	10	11	10
Others 151 Countries		26	27	27	28	28
World Average		43	108	113	127	131

Source: FAO

Pakistan Yield of tomato is much below the world average i.e. 4.0 tones per acre as compared to that of 43 for the world, whereas the highest yield received by Belgium is 202 tone. per acre. There is great scope of increasing production from the same area by increasing per acre yields. Most of the major producers are getting yield of more than 11 Tones per acre. The yield position of Pakistan relative to the world average and the world highest is given below.

World Yield Comparison Tons/Acre





Tomato Cultivation in Pakistan

Tomato cultivation has steadily grown at the pace of about 4.7 per annum during the last 10 years. The area of tomato in Pakistan is given below:

Year	Punjab	Sindh	N.W.F.P.	Balochistan	Pakistan
1994-95	10.63	14.58	25.21	13.10	63.51
1995-96	10.87	15.57	29.16	13.84	69.44
1996-97	11.37	15.57	30.15	14.33	71.41
1997-98	11.61	15.32	30.15	16.31	73.39
1998-99	11.86	15.57	31.88	15.57	74.87
1999-00	12.36	15.07	33.36	11.86	72.65
2000-01	10.87	15.07	33.85	9.39	69.19
2001-02	11.12	14.33	34.84	12.36	72.65
2002-03	11.86	15.07	36.08	13.59	76.60
2003-04	12.85	15.32	37.31	30.89	96.37
2004-05	12.60	15.07	39.04	35.58	102.30

Source: Federal Bureau of Statistics Government of Pakistan, Karachi

Tomato Production in Pakistan

Tomato in Punjab is mainly produced in Southern part comprising of Sheikhpura, Gujranwala, Bahawalpur, Kasur, Okara, Rahim Yar Khan and Khushab Districts. For Kharif crop Mardan Mangora, Swat Valley, Hazara, Deer, Mansehra, Haripur, Charsada, Malakand, Dera Ismaeel Khan and for Rabi crop Peshawar, Charsada, Noshera, Mangora Mardan, Malakand, Thank, Dera Ismaeel Khan are main tomato producing Districts in NWFP. Similarly Quetta, Loralai, Qila Saifullah, Mastung, Khuzdar, Pishin are main tomato producing Districts in Balochistan.

Year	Punjab	Sindh	N.W.F.P.	Balochistan	Pakistan
1994-95	61.60	29.80	101.10	83.30	275.80
1995-96	64.10	32.20	119.40	88.90	304.60
1996-97	65.50	32.20	124.30	91.10	313.10
1997-98	65.30	32.40	123.10	104.50	325.30
1998-99	68.90	32.40	130.50	100.30	332.10
1999-00	71.60	30.80	138.10	42.70	283.20
2000-01	60.80	32.90	140.00	36.10	269.80
2001-02	62.20	32.80	146.20	52.90	294.10
2002-03	65.20	35.00	148.30	57.80	306.30
2003-04	64.00	35.70	157.50	155.60	412.80
2004-05	63.70	34.00	146.90	181.60	426.20

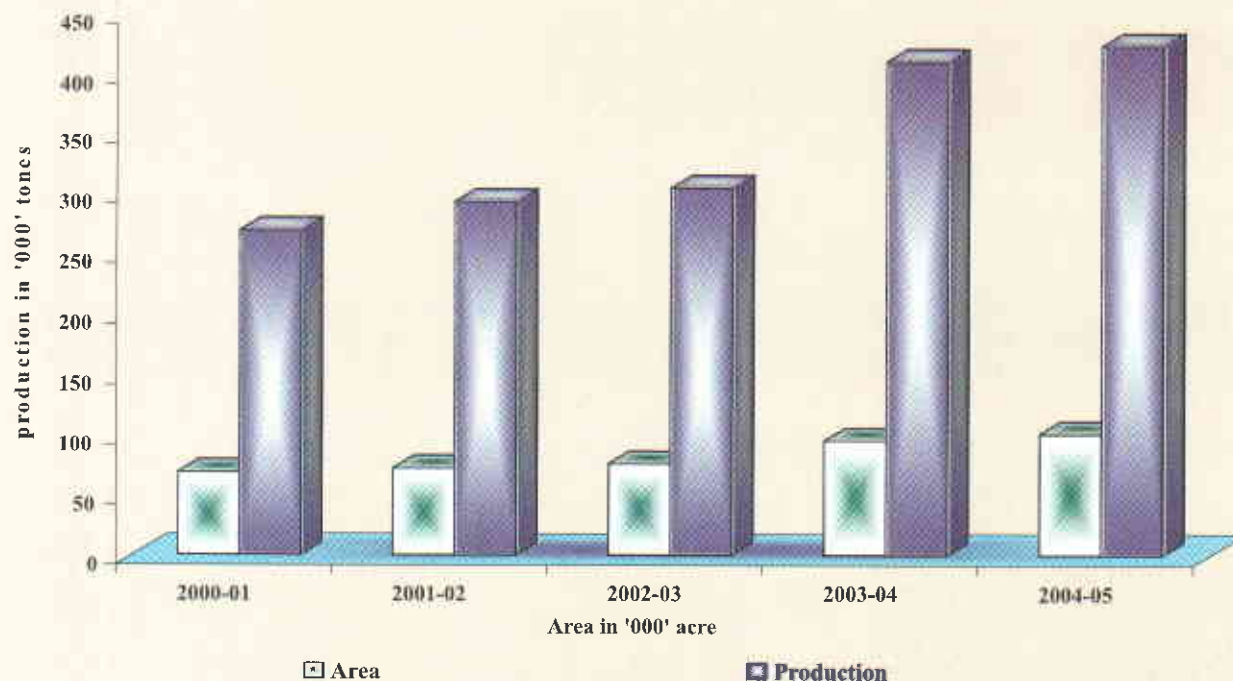
Source: Federal Bureau of Statistics Government of Pakistan, Karachi





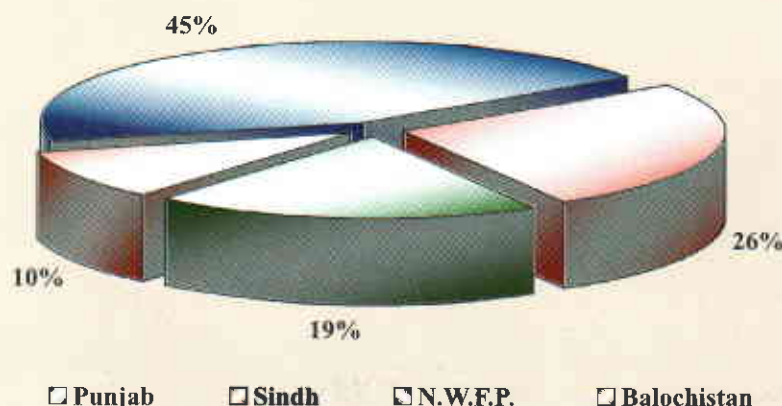
Pakistan annually produces about 4.2 million tons of tomato. Though subjected to annual variations, overall area under tomato in Pakistan have shown an increasing trend during the last 10 years, whereas the production of tomato has been increasing at the rate of 3.9% during last decade. Overall tomato production is increasing. It has reached 426.20 thousand tones in 2005 with 39.92% increase from 304 million tones in 1995-96, which is given in the table:

Area & Production of Tomato



Province wise Production Share of Tomato

In Pakistan there is a considerable diversity in sowing period of tomato. The commodity keeps coming throughout the year from one ecological region or the other into various markets of the country. NWFP is the largest contributor in tomato production having a share of about 45 % followed by Balochistan, Punjab and NWFP with a share of 26, 19 and 10 percent respectively. Province-wise production share of tomato are presented in the chart.





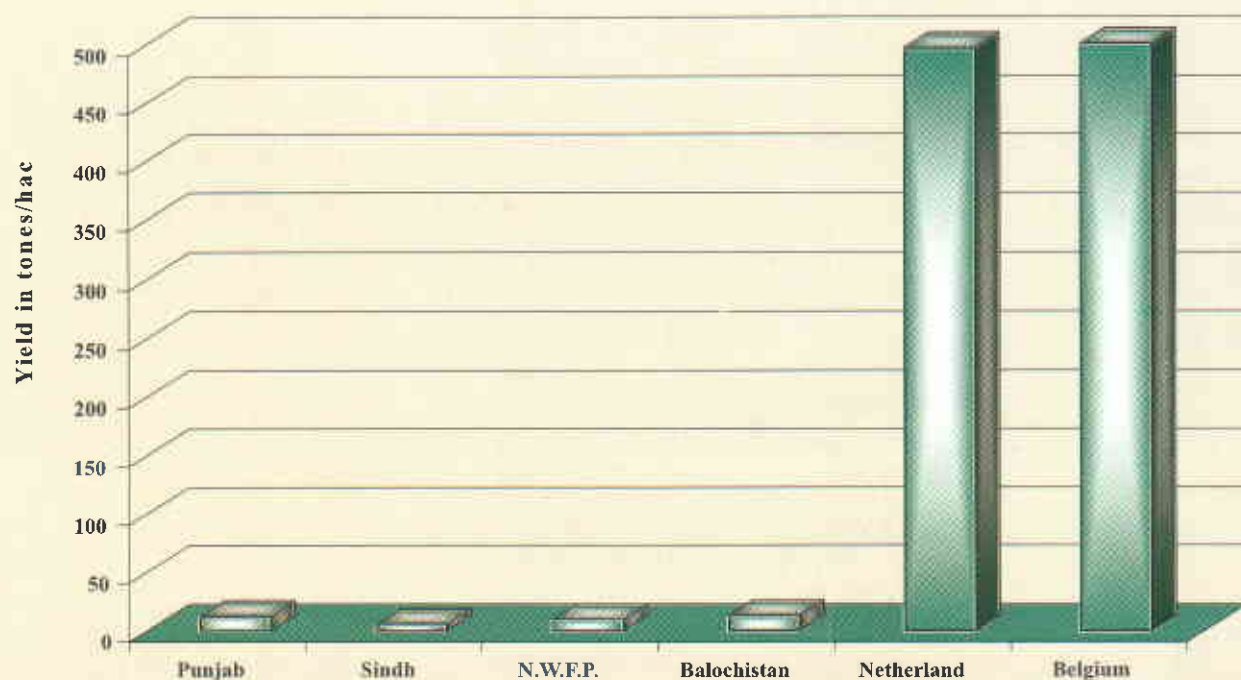
Tomato Yield in Pakistan

Kg Per Hectare

Year	Punjab	Sindh	N.W.F.P.	Balochistan	Pakistan
1994-95	14.30	5.10	9.90	15.70	14.33
1995-96	14.60	5.10	10.10	15.90	14.57
1996-97	14.20	5.10	10.20	15.70	14.24
1997-98	13.90	5.20	10.10	15.80	13.89
1998-99	14.40	5.10	10.10	15.90	14.35
1999-00	14.30	5.00	10.20	8.90	14.32
2000-01	13.80	5.40	10.20	9.50	13.82
2001-02	13.80	5.70	10.40	10.60	13.82
2002-03	13.00	5.70	12.30	10.60	13.58
2003-04	12.40	5.70	10.40	12.50	12.31
2004-05	12.50	5.60	9.30	12.60	12.49

Source: Federal Bureau of Statistics Government of Pakistan, Karachi

Yield Trend of Tomato in Pakistan & leading Belgium & Nether Land





Area & Production of Tomato in Punjab

Area in 000 acre
Production in 000 Tones

Year	Punjab		Others		Pakistan	
	Area	Prod.	Area	Prod.	Area	Prod.
1994-95	10.63	61.60	52.88	214.20	63.51	275.80
1995-96	10.87	64.10	58.57	240.50	69.44	304.60
1996-97	11.37	65.50	60.05	247.60	71.41	313.10
1997-98	11.61	65.30	61.78	260.00	73.39	325.30
1998-99	11.86	68.90	63.01	263.20	74.87	332.10
1999-00	12.36	71.60	60.29	211.60	72.65	283.20
2000-01	10.87	60.80	58.32	209.00	69.19	269.80
2001-02	11.12	62.2	61.53	231.90	72.65	294.10
2002-03	11.86	65.2	64.74	241.10	76.60	306.30
2003-04	12.85	64.00	83.52	348.80	96.37	412.80
2004-05	12.60	63.70	89.69	362.50	102.29	426.20

Source: Federal Bureau of Statistics Government of Pakistan, Karachi

District wise Area & Production of Tomato in the Punjab for the year 2005-06

Area in acres
Production in Tones

Sr. No.	District	Area	Production	%age Share
1	Gujranwala	1295	7009	10.85
2	Nankana Sahib	1580	6959	10.77
3	Muzaffargarh	1140	5957	9.22
4	R.Y.Khan	1100	5502	8.52
5	Khushab	1050	4899	7.59
6	Bahawalpur	765	3912	6.06
7	Bahawalnagar	680	3680	5.70
8	Sheikhupura	793	3493	5.41
9	Sahiwal	710	2915	4.51
10	Sargodha	400	2239	3.47
Sub Total:		9513	46565	72.10
Others Districts:		3561	18023	27.90
Total Punjab:		13074	64588	100.00

Source: Crop Reporting Service of Pakistan

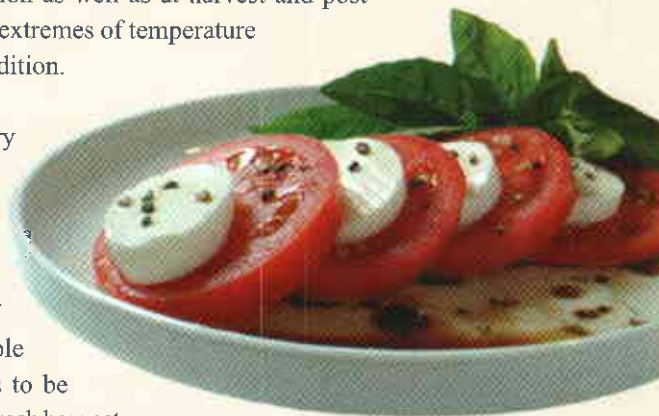




Trade Cycle of Tomato

Tomato is considered one of the ancient and important condiments of daily use. It is consumed both as vegetable and salad. Tomato is a Perishable commodity particularly high temperature is very much detrimental to its shelf life. Moderate temperature is suitable for proper formation as well as at harvest and post harvest storage. The tomato crop is sensitive to both extremes of temperature and its mortality is extra ordinary high under such condition.

The agro-ecological diversity obtained in the country enables production of Tomato almost around the year. The tomato crop is harvested from April to July. The augmented supplies tend to keep prices in the domestic market low thereby offering an opportunity for caned tomato. Due to limited shelf life and absence of advance value addition and suitable storage facilities in the country, tomato mostly has to be disposed in the domestic and international market as fresh harvest.



NWFP province contributes major portion of production, which is about 45 percent. Balochistan is second with 26%, Punjab contributes 19 and NWFP 10 percent. All the provinces are inter- dependent for the supply of tomato during different seasons. The supply period of different provinces is shown in the trade cycle of tomato along with the major producing areas of the respective province.

Province	Major Areas	Availability
Punjab	Sheikhupura, Gujranwala, Bahawalpur, Kasur, Okara, Rahim Yar Khan, Khushab,,	April to July
NWFP	(Kharif) Mardan Mangora, Swat Valley, Hazara, Deera, Mansehra, Haripur, Charsada, Malakand, Dera Ismaeel Khan	Aug. Nov.
	(Rabi) Peshawar, Charsada, Noshera, Mangora Mardan, Malakand, Thank, Dera Ismaeel Khan	December
Balochistan	(Kharif) Quetta, Loralai, Qila Saifullah, Mastung, Khuzdar, Pishin	Nov. to February
	(Rabi) Bolan, Kharan Lasbella, Turbet, Sibi	September to October
Sindh	Badin, Hyderabad, Thatha, Karachi, Noshera Feroze, Nawab Shah, Umerkot, Mirpur Khas.	Dec. to April

