

Sundried Tomatoes of Ladakh

Anshumali Pandey

Institute of Hotel Management, Silvassa, India

Abstract: After Sea buck thorn (Leh Berry) and Apricots, Tomatoes are the major source of Nutrition in the remote and high altitude cold desert of India – Ladakh. With the advent of green houses and availability of hybrid seeds, the locals are now able to grow more tomatoes than before. However, the tomatoes need to be stored for usage in the harsh winters when the temperatures fall more than 20 degrees below zero even during the day. Thus the requirement of sundry technique comes into picture.

Keywords: Sundried, Tomatoes, Food Security, Ladakh, Cold and Arid Climate.

I. INTRODUCTION

After Sea buck thorn (Leh Berry) and Apricots, Tomatoes are the major source of Nutrition in the remote and high altitude cold desert of India – Ladakh. Ladakh is managed by Ladakh Autonomous Hill Development Council, LAHDC Leh and is a part of the state of Jammu & Kashmir in India. With the advent of green houses and availability of hybrid seeds, the locals are now able to grow more tomatoes than before. However, the tomatoes need to be stored for usage in the harsh winters when the temperatures fall more than 20 degrees below zero even during the day. Thus the requirement of sundry technique comes into picture.

II. SUNDRIED TOMATOES OF LADAKH

Sun-dried tomatoes are ripe tomatoes that lose most of their water content after spending a majority of their drying time in the sun. These tomatoes are usually pre-treated with salt before being placed in the sun in order to improve quality. Typically, tomatoes spend one week in the sun in order for the sun-drying process to be complete. Cherry types of tomatoes will lose 88 % of their initial (fresh) weight, while larger tomatoes can lose up to 93% during the process. As a result, it takes anywhere from 8 to 14 kilos of fresh tomatoes to make a single kilo of sun-dried tomatoes.

After the procedure, the tomato fruits will keep their nutritional value. The tomatoes are high in antioxidants, and vitamin C. The final products may contain up to 2–6% of salt and could provide a significant contribution to the day's intake. Sun-dried tomatoes can be used in a wide variety of recipes and come in a variety of shapes, colors, and tomatoes. Traditionally, in Ladakh's Leh and Zaskar valleys they were made from dried red plum tomatoes, but now they can be purchased in yellow varieties also. Sun-dried tomatoes are also available in the form of pastes or purées. The most common variety which is easily available on the Ladakhi roadside market is the dried ones.

Italian and Spanish Sun-dried tomatoes are preserved in olive oil, along with other ingredients such as rosemary, basil, dried paprika, and garlic. However, Ladakh does not require all the frills as the availability of the raw materials are scarce and the dry cold weather of Ladakh ensures a long shelf life of the sun dried tomatoes any way.

The standard way of growing tomatoes in a Ladakhi Greenhouse as guided by the department of agriculture and horticulture, Leh, Ladakh is as follow.

A standard potting soil mix is used with about 10% worm castings added. Standard potting soil is usually equal parts perlite, vermiculite, and sphagnum peat and is adjusted to the right PH by adding 1 teaspoon of hydrated lime for every gallon of soil mix. Ph adjusting your mix this way for tomatoes is good because the lime is a good source of calcium, which prevents blossom end rot in tomatoes later on.

Start with a regular nursery tray full of your soil mix. Tomato seeds should be planted $\frac{1}{4}$ inch (0.6 cm) deep, and about 8 seeds/inch. It should be covered for the first few days to keep them from drying out. Tomato seeds germinate best at 25 to

28 degree C, and should be mostly up in 5 to 12 days. Remove any cover you may have on them as soon as they begin popping up. The fresh sprouts should be kept 4 to 6 inches (10.2 to 15.2 cm) under a fluorescent light. The light should be kept on 18 to 24 hours a day. When they are 1 1/2 inches (3.8 cm) tall, carefully transplant them into their own 6 inch (15.2 cm) containers.

Some tomatoes flower in 60 days and others take up to 80 days, beginning from the time you force flowering. Just as you begin this process, you want to make your final transplant into 3 gallon (11.4 L) containers. For the first two weeks, you want to feed them heavy with a 10-52-70 or similar fertilizer. Each time they need water, give them food also at 800 ppm, which would be a little over half of the recommended "full strength" on the directions. Keep in mind you are feeding them each time you water them. For the rest of the season, feed them 16-16-16 or similar at 800 ppm.

Ideally, the humidity will be 65 to 70 percent. Greenhouse growers in Ladakh usually do this between 10:30am and 2:30pm (basically noon) when these conditions occur naturally. For them, early and late day pollination often will not produce proper crops. The tomato flower consists of two parts. The male anthers will drop the pollen. The female carpels will catch the pollen. The resource link below includes pictures of both and of tomato flower pollination. Most male anthers produce their pollen on the outsides of the anthers, making it easy to release pollen into the wind for pollination. In the tomato plant, however, pollen is produced internally, as if trapped in a straw. This is the biggest problem for tomato pollination. The plant needs vibration at the right frequency, such as the buzzing of a bees wings, to dislodge and release the pollen. Take an electric toothbrush to each support truss and main branch. The more pollen to successfully fertilize the plant, the more seeds will be produced in the fruit (and therefore the meatier the tomato will be). Larger tomato growing operations should consider bees for pollination.

How the tomatoes are sun dried in Ladakh: The weather in Ladakh is cold and dry with very little humidity. Thus it makes easier to sundry any vegetable product. Tomatoes in this case are cut into roundels and spread on a large tray. The skin and seeds are not removed so that the maximum of the weight is utilized. The day time in Ladakh is usually very sunny and the dry wind makes the drying process easier. It may take around 10 days to completely sundry the tomatoes in such a way that there is no moisture left in the pulp. This way it becomes easier to store for a long time and helps with the nutrition addenda in the Ladakhi food, along with other dried products like cauliflower, potatoes and most importantly Yalk milk Cheese.

A Regional Seminar on Horticulture was held on September 17-18 2012, in Leh, Ladakh. Speaking on the topic of "PROTECTED CULTIVATION TECHNOLOGIES AND TYPES OF GREENHOUSE SUITABLE FOR LADAKH REGION", M.S. Mir and M.S. Kanwar presented an astounding topic. Excerpt from the presentation will help my discussion in the right direction. "It has been the general observation that the productivity and quality of cucurbits and solanaceous crops in open field conditions of cold arid region is generally low, except in limited areas in the lower Indus belt and along the confluence of Suru and Drass rivers because of the biotic and abiotic stress faced by crops in open field cultivation. Productions of these crops in these structures (greenhouse) have been found to be remunerative, as these structures eliminate the stress, especially diurnal fluctuation of temperature. In a cold arid climate, tomato crop can be grown for duration of about six months with production of superior quality fruits under naturally ventilated green houses.....Production technology of large fruited tomato has been developed for naturally ventilated greenhouse conditions."

III. NUTRITIONAL VALUE OF SUN DRIED TOMATOES

Amount per 100 grams

| % Daily Value* | |
|---------------------------|-----|
| Total Fat 3 g | 4% |
| Saturated fat 0.4 g | 2% |
| Polyunsaturated fat 1.1 g | |
| Monounsaturated fat 0.5 g | |
| Cholesterol 0 mg | 0% |
| Sodium 247 mg | 10% |

| | | | |
|-------------------------|-----|-------------|-----|
| Potassium 3,427 mg | | 97% | |
| Total Carbohydrate 56 g | | 18% | |
| Dietary fiber 12 g | | 48% | |
| Sugar 38 g | | | |
| Protein 14 g | | 28% | |
| Vitamin A | 17% | Vitamin C | 65% |
| Calcium | 11% | Iron | 50% |
| Vitamin D | 0% | Vitamin B-6 | 15% |
| Vitamin B-12 | 0% | Magnesium | 48% |

*Per cent Daily Values are based on a 2,000 calorie diet



Pic 1. Sundried Tomatoes, Leh, Laddakh



Pic 2. A Laddakhi lady selling dried products on in the Leh market

IV. CONCLUSION

In a high altitude, cold and arid climate it becomes mandatory for farmers to take help of scientific methods of farming and increase their output in the adverse climate. Sundried Tomatoes are excellent source of nutrition and helps hundreds of Laddakhis who live there in the six months of hostile winters.

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