

CHAPTER 4

USES AND CONSUMPTION

SHYAM S. YADAV¹, PHILIP C. STEVENSON², A. H. RIZVI¹,
M. MANOHAR¹, S. GAILING³, AND G. MATELJAN³

¹ Pulse Laboratory, Division of Genetics, Indian Agricultural Research Institute, New Delhi 110012, India

² Natural Resources Institute, University of Greenwich, Chatham, Kent ME4 4TB and Royal Botanic Gardens, Kew, Surrey, TW9 3AB, UK

³ The George Mateljan Foundation, PO Box 25801, Seattle, Washington 98165, USA
Email: shyamsinghyadav@yahoo.com

Abstract: Lentils are one the earliest known crops to be cultivated and archaeological evidence goes back at least 7000 years. They have been in constant use in different societies since then and their consumption has been widespread in developed and developing countries alike. It is consumed for its flavour, its versatility and its high nutritive value and other health benefits which are briefly discussed here and elsewhere in this book. In most of the Asian countries and particularly in the Indian subcontinent the major use for lentil is for making *dhal* for which the red lentils are preferred. The types of lentil soups prepared in different countries and regions throughout the world vary enormously depending on local tradition and palate from the spicy Indian *dhals* to the more aromatic north African lentil soups to the meat based European dishes and several recipes are included here. *Dhal* alone describes a whole group of dishes which vary enormously from the different regions of India and the other countries of the subcontinent. They are also used uncooked; either soaked crushed and moulded to make cakes or sprouted as an ingredient in salads in some parts of India and as such provide better nutrient value

1. INTRODUCTION

Lentil has a variety of different names in different countries and languages including *Masoor* (India), *Adas* (Arabic), *Mercimek* (Turkey), *Messer* (Ethiopia) and *Heramame* (Japanese) giving some indication of the breadth of their importance. Lentils are believed to have originated in central Asia, having been an important food since prehistoric times and are one of the first foods to have been cultivated (Sarker and Erskine, 2006). Lentil seeds dating back 7000 years have been found at archeological sites in the Middle East and from the Iberian peninsula (Zapata et al., 2004). Chemical analysis of the contents of a tomb discovered in central

Turkey at what was Gordion, the capital of the then-powerful Phrygian kingdom and reportedly dating back to 2500 BC indicates that wealthy people dined on barbecued lamb with a spicy stew (olive oil, honey and wine) and lentils. A king aged about 60 was buried in the tomb in a wooden coffin under a huge mound and is considered by some to be the tomb of King Midas (McGovern et al., 1999). Lentils are even mentioned several times in the Bible. For example, Esau traded his birthright with Jacob for a plate of food made from lentil (Genesis 25:34) and they were an ingredient in bread that was made during the Babylonian captivity of the Jewish people (Ezekiel 4:9). Lentils were part of the provisions brought to David when fleeing from Absalom (2 Samuel, 17:28).

For millennia, lentils have been eaten traditionally with barley and wheat, three foodstuffs that originated in the same regions and spread throughout Africa and Europe during similar migrations and explorations of cultural tribes. Before the 1st century AD, they were introduced into India, a country whose traditional cuisine still bestows high regard for the spiced lentil dish known as dhal. In many Catholic countries, lentils have long been used as a staple food during Lent although there appears to be no common origin of the two words. Currently, the leading commercial producers of lentils are India, Turkey, Canada, China and Syria.

The lentil (*Lens culinaris*: Leguminosae) is a bushy annual grown for its seeds that are characteristically lens-shaped; hence the name. It grows to about 40 cm tall and the seeds develop in the pods, usually with two seeds in each. With 25% protein it is the vegetable with the highest level of protein after soybeans (Bhattacharya et al., 2005), and because of this it is a very important part of the diet in many parts of the world, and especially South Asia which has a large vegetarian population (Singh, 1999).

The cooked seeds have a distinctive earthy flavor and importantly a short cooking time (especially for the small varieties with the husk removed such as the common red lentil). This can, however, be affected by harvesting procedure, storage time and even climatic conditions (Iliadis, 2001). Lentils are used throughout the Mediterranean regions and the Middle East as the basis of many meals but they are also used to make inexpensive and nutritious soups that are popular in Europe and North America as well. Indeed, in Europe they are often combined with some form of pork but in Asia they are most frequently combined with rice, which, conveniently, has a similar cooking time. Seeds are also reportedly used as a source of starch for textile and printing (Kay, 1979).

2. USE OF LENTIL AS A NUTRITIOUS AND HEALTHY FOOD

Lentil is grown for its seed and then eaten primarily as dhal. Dhal describes seeds (usually pulses) that are decorticated and split leaving just the lens shaped cotyledon which in lentil has higher protein, carbohydrate and calorie content than many other legumes. It is the most desired crop in many lentil producing regions particularly for its high protein content and fast cooking characteristic (Iqbal et al., 2006; Muehlbauer et al., 1985). Grain is fried and seasoned as well as being boiled. Lentil flour is also

a basic ingredient in many soups, stews, purees and is even mixed with cereals to make bread and cakes and as a food for infants (Williams and Singh, 1988). While lentils are considered to be highly nutritious, they also contain anti-nutritional factors such as, trypsin inhibitors, hemagglutinins, and oligosaccharides to which the flatulence often associated with pulses is attributed (Jambunathan et al., 1994; Abdelgawad, 1993). However, Williams et al. (1994) reported that lentils have relatively low levels of these anti-nutritional factors compared to other pulse legumes such as faba bean which is considered to have the highest concentrations. Tannins can impart a bitter flavour to the food as they are present in high concentrations in the seed coat of lentils. However, they can be removed by processing (Williams et al., 1994), most often and easily by removing the seed coat. These husks along with dried leaves, stems, fruit walls and bran (residues), can be fed to livestock. Lentil residues contain about 10.2% moisture, 1.8% fat, 4.4% protein, 50% carbohydrate, 21.4% fibre, and 12.2% ash (Muehlbauer et al., 1985) but nutrient levels can vary greatly according to the variety (Wang and Daun, 2006). The nutritional aspects of the seed are discussed in more detail elsewhere in this book. Lentils not only provide valuable food for humans but also for livestock. According to Muehlbauer et al. (1985), when production of forage crops falls below the level required in the market, lentil residue commands an equal or a better price than lentil seeds in some Middle Eastern countries. Green plants also make valuable green manure.

Lentils are quick and easy to prepare compared to other dried pulses and are also a very healthy food for a number of reasons and there are several websites dedicated to healthy eating that extol the virtues of this pulse such as www.whfoods.org. These health and cooking qualities are enhanced by the fact that the split peas easily absorb flavors from spices, other foods and seasonings and are usually available throughout the year. Lentils are sold whole or split into halves with the brown and green varieties retaining their shape well after cooking compared to other varieties.

Lentils, are also a very good source of cholesterol-lowering fibre. Lentils can help to lower cholesterol, are reportedly beneficial in managing blood-sugar disorders as mentioned above since their high levels of soluble fibre prevents blood sugar levels from rising rapidly after a meal (Araya et al., 2002; Brand-Millar et al., 2003) and could be a route to reducing cholesterol (Roberts et al. 1994). But lentils have still more to offer. They provide excellent amounts of six important minerals, two B-vitamins, and protein with virtually no fat. The calorie cost of all this nutrition? Just 230 calories for a whole cup of cooked lentils. This tiny food giant fills you up—not out.

Pulses, including lentils, are used increasingly in health-conscious diets to promote general well-being and reduce the risk of illness. As mentioned above lentils are particularly low in fat but high in protein (Iqbal et al., 2006), and are an excellent source of both soluble and insoluble fibre, complex carbohydrates, vitamins (especially B vitamins) and minerals (especially potassium, phosphorus, calcium, magnesium, copper, iron and zinc) yet lentils are inexpensive compared to other food sources with similar properties. Eating lentils may help lower blood

cholesterol levels due to their high content of soluble fibre and vegetable protein (Anon, 2006; Rani and Kawatra, 1994).

Lentils can be beneficial in the management of type-2 diabetes since they have a low glycemic index (<55) suggesting that their impact on blood glucose levels is lower than that of many other carbohydrate containing foods (Anon, 2006; Araya et al., 2002). They have been shown to have low glycemic potential even when mixed with other grains (Hardacre et al., 2006). Lentils also reduce blood lipids that may help some serious complications of diabetes.

Flour made from lentils is gluten free and is a nutritious alternative to wheat based products for people with celiac disease a condition which damages the small intestine, interferes with absorption and makes sufferers intolerant of gluten. Lentil is very well suited to vegetarian diets as they are a good source of protein and iron, and complement the amino acid profile of cereals and nuts (Anon, 2006; Iqbal et al., 2006). The consumption of insoluble fibre can help maintain a healthy colon and so reduce the risks of colon cancer. Diets high in fibre also help with weight loss because they deliver more bulk and less carbohydrate. Lentils are also an excellent source of vitamin B9 (folic acid) which is an essential nutrient especially during pregnancy where it has been shown to reduce the risk of neural tube defects.

Lentils are good for the heart. The traditional Mediterranean diet encompasses dietary characteristics that include high levels of fruits, vegetables, legumes such as lentil and whole grains as well as fish, nuts, and low-fat dairy products. These have been shown to have protective health effects including being associated with a reduced risk of coronary heart disease (Giuliano and Esposito, 2005, Flight and Clifton, 2006). The contribution of lentils to the health of our heart also lies in the substantial content of folic acid and magnesium. As well as being an important vitamin in pregnancy folic acid helps lower levels of homocysteine, an amino acid that is an intermediate product in an important metabolic process called the methylation cycle (Araki et al., 2006) which converts homocysteine into the benign amino acids cysteine or methionine. High levels of homocysteine in the bloodstream damage artery walls and contribute to heart disease.

The magnesium in lentil acts as a calcium channel blocker, which helps to relax, blood vessels and improve blood flow and the transport of oxygen and nutrients throughout the body. Magnesium deficiency can also promote free radical injury to the heart immediately following a heart attack. Lentils are also a good source of iron although the available levels can be affected by cooking (Viadel et al., 2006) so eating them uncooked for instance after soaking or sprouted as described later in this chapter should be encouraged. Iron, of course, is an integral component of haemoglobin, the metalloprotein that transports oxygen from the lungs around the body. Lentils can therefore enhance energy by topping up iron. This is particularly important during menstruation, pregnancy or for those who are at risk of iron deficiency such as those with sickle cell and thalassaemia trait. And unlike red meat, perhaps the most obvious source of iron, lentils are low in fat and calories.

As mentioned throughout this chapter, legumes are rich in important nutrients and are thus excellent food. Pulses have been classified by different food based

organizations into different categories on the basis of the percent of daily value of food that they contribute to the diet. According to www.whfoods.org lentils have excellent levels of molybdenum and folic acid, very good levels of tryptophan, fibre and manganese and good levels of Iron, Protein, Phosphorus, Copper, vitamin B1 (thiamin) and Potassium. Nutritional qualities of lentil will be covered in detail in the following chapter.

Lentils are purported to remedy constipation and other intestinal afflictions (Muehlbauer and Tullu, 1997). According to Duke (1981) lentils were used in India as poultices on the ulcers that follow smallpox and other slow-healing sores. In the 6th century, chickpeas were believed to be an aphrodisiac; while curiously enough, lentils were considered to have the opposite effect, and this was probably the reason why the lentil was included in the diet in monasteries on meatless days (Van der Maesen, 1972).

3. NUTRITIONAL QUALITY PARAMETERS

The amount of protein in lentils reportedly ranges from 22–30% (Wang and Daun, 2006), and 100 g of dried seeds contain 340–346 g calories, 12% moisture, 20.2 g protein, 0.6 g fat, 65.0 g total carbohydrate, about 4 g fibre, 2.1 g ash, 68 mg Ca, 325 mg P, 7.0 mg Fe, 29 mg Na, 780 mg K, 0.46 mg thiamine, 0.33 mg riboflavin, 1.3 mg niacin (Adsule et al., 1989; Muehlbauer et al., 1985). Among the cool season legume crops, lentil is the richest in the amino acids that are low in vegetarian diets (e.g., lysine, arginine, leucine, and sulphur containing amino acids) that are chosen by or imposed by poverty on different people throughout the world (Iqbal et al., 2006; Williams et al., 1994). The starch content ranges from 35–53% of which amylose comprises between 20 and 38.5% while dry matter constitutes 42% (Huisman and van der Poel, 1994; Hulse, 1994). In addition to thiamine and riboflavin, lentils are a good source of the other vitamins and 100 g lentil contains 1.7 mg nicotinic acid, 223 mg choline, 107 mg folic acid, 130 mg inositol, 1.6 mg pantothenic acid, 13.2 mg biotin, and 0.49 mg pyridoxine. With the exception of folic and pantothenic acids, vitamins increase markedly during sprouting thus this is a valuable way of consuming the seeds. Dry lentil husks contain 11.1% protein (1.3% digestible), 0.7% fat, 47.5% carbohydrate, 25.6% fibre, and 3.1% ash (Duke, 1981). The majority of the protein present in the cotyledons consists primarily of albumins and globulins, and lentil digestibility coefficients are relatively high and range from 78–93%. Oleic, palmitic and linoleic are the dominant fatty acids (Hulse, 1994) although the nutritional characters for the seeds are discussed in more detail elsewhere.

4. USE AND CONSUMPTION OF LENTILS: A PREPARATION GUIDE

Unlike some pulses, lentils do not need to be presoaked so can be prepared the day of serving since they are fairly small. Some dishes are enhanced by soaking though. Before washing lentils in clean cold water its worth spreading them out on a table

top to check for small stones and other unwanted debris before cooking. There's nothing more off-putting than the crack of teeth against a small stone in food. To boil lentils, use three cups of liquid for each cup of lentils. Lentils placed in water that is already boiling will be more easily digested than if brought to a boil with the water. Green lentils usually take about 10 minutes more than red ones. But both are cooked fairly quickly compared to other pulses which make them especially favorable pulse in poor households since they require less fuel although this does not mean lentils are restricted to poor households.

4.1. Cooked Lentils

Lentils cook in about 20 to 25 minutes and can give a firm, but tender, seed to use in salads. Use about 1 cup of lentil in 3 cups of water. Bring water to boil and turn heat down to simmer until tender or until they are the required consistency. Seasoning with salt and pepper in the last few minutes of cooking helps with their flavour. Drain off water and reserve. (Reserved water can be used to serve over baked potatoes or rice.) To finish your salad, simply add chopped vegetables of your choice, lemon juice, a little olive oil, garlic, and seasonings for nutritious entree salad. Lentils can also be added to vegetable soups or even potato soups to encouraged thickening. This requires the lentils to be cooked for about 45 minutes so they will be completely broken down. Lentil soup with added lemon is a favorite of Middle Eastern households whereas in India aromatic spices are added. Cooking times can be reduced substantially by using a pressure cooker which precludes the need to soak many other pulses. Lentils are still the quickest to cook even by this method and usually take no more than 7 minutes. Lentils are most commonly consumed as dhal, the spicy and highly variable soup from South Asia that can be made with many different pulses including Lentil (Masoor – *Lens culinaris*), Moong bean (green gram – *Phaseolus aureus*), chickpea (channa/chole – *Cicer arietinum*), urad dhal (black gram – *Phaseolus mungo*) and Pigeonpea (Arhar – *Cajanus cajan*).

4.2. Uncooked Lentils

A less common way to consume Masoor lentils is as bean sprouts. A simple procedure to sprout lentils is to take between 6 & 8 table spoons of seeds (with husks) and soak them overnight in plenty of water ensuring the lentils are completely covered. The following day, the seeds can be drained and rinsed and then placed into a wide mouthed jar covered with muslin cloth that has been secured with a rubber band. The jar can be laid on its side and covered with a towel and set aside for the day, rinsing them occasionally (once or twice in 24 hours). In colder environments the seeds may take longer to sprout. The sprouts have a characteristic nutty flavour. White sprouts are more likely to be produced if kept in the dark but for green sprouts then sprout in light but not direct sunlight. The green and white give two slightly different textures and tastes and also provide two different colour options for a variety of aesthetic looks. Sprouted seeds store well in any unsealed

container including plastic bags or plastic pots and will keep for 3–4 days if rinsed regularly. They are a fresh alternative in salads and also stir fries.

4.3. Tempering Dhal

Tempering or seasoning is very important for dhal both for appearance and flavour. For example, turmeric gives dhal the lovely golden color. There are countless variations of simple seasoning from ingredients that include salt and pepper, mustard seeds, red chilies or chili powder, asafetida (*hing*), onions, green chilies, ginger, garlic, tomatoes, Garam Masala and curry leaves (*Murraya koenigii*). The oil most commonly used for cooking lentils is clarified butter (ghee) or sunflower oil for vegans. The oil is important for frying the spices and seasonings which are added to the cooked dhal. Dhal also benefits from a generous handful of freshly chopped coriander.

5. UTILIZATION IN INDIA

Indians consume more lentils than any other country and the country produces more than 50 varieties of the crop. Despite the wide variety of different people who consume them the most common methods of preparation are more or less the same in these countries and include dhals and thinner lentil soups, but local ecologies and food habits differ further afield towards the middle east and Europe where they are often eaten as an accompaniment to or sauce for meats. Dhal is the staple food in every Indian home with rich and poor equally enjoying it. It is India's comfort food and usually accompanies every meal eaten along with either hot steaming rice or fresh *chapati* (leavened bread) straight off the griddle or *dhaba* (dry frying pan). It is also dried with spices to produce spice capsules to add to foods. The simplest may be boiled with turmeric and ginger and then seasoned with sautéed onion and tomatoes. Roasted or fried cumin seeds add an extra dimension to dhals and aids in their digestion.

5.1. Some Cooking Ideas for Dhal – Indian Style

Below are 3 different ideas for how to cook lentils as you might find them in an Indian home. They have been provided by P. Stevenson's aunt-Sudershan Kumari from Peterborough, (UK) – and from experience he guarantees their quality and excellent flavour. In each case the lentil seeds need to be sorted for small stones and other unwanted debris and washed thoroughly before use.

MIXED DHAL SOUP

The following dish is Punjabi and includes a mixture of 3 types of lentils (which can vary even from those presented below) and the ingredients are

- urid/urad (black) dhal (*Phaseolus mungo*) – 1 cup
- mung (green) dhal (*Phaseolus aureus*) – 1 cup;
- masoor (pink) dhal (*Lens culinaris*) – ½ cup
- water – 7 ½ cups

2 medium onions, chopped finely
 2 garlic cloves, chopped
 fresh ginger, 1 inch cube, chopped finely
 oil, 2–3 tbsp
 cumin seeds, 1 tsp
 1–2 fresh green chillies
 turmeric, 1 tsp
 tomatoes (2–3 fresh chopped or 1/2 tin)
 fenugreek powder, 1/2 tsp
 garam masala, 1 teaspoon
 salt, 1 1/2 tsp
 fresh coriander, handful, chopped

Wash dhals and soak for at least 4 hrs in 7 1/2 cups of water. Then add 1 1/2 tsp salt and boil until soft (1/2 hr if using a pressure cooker, longer if not). Heat oil in pan on a medium heat and when hot add cumin seeds. When seeds pop, then add onions and garlic and fry until golden brown. Then add ginger and chillies and fry for a few more minutes. Add turmeric, fenugreek powder and tomatoes. Add this mixture to the dhal and finally add garam masala and fresh roughly cut coriander. Delicious!

LENTIL PAKORA

Masoor (Pink) lentils (*Lens culinaris*), 1 cup
 Moong (green) lentils (*Phaseolus aureus*), 1 cup
 Chillies, 1 fresh green or 1/2 tsp red powder
 Garam masala, 1 tbsp
 1 medium onion, chopped
 salt, 1 tsp
 besan (chickpea) flour (*Cicer arietinum*), 2 tbsp (optional)
 1–2 medium potatoes, very thinly sliced into discs

Soak dhal for 2–3 hours, until soft and then grind into a soft batter (add water if needed). Add salt, chillies, garam masala, onions and potatoes. Other vegetables can also be added if desired (e.g. cauliflower, spinach). Mix all the ingredients into a thick lumpy paste. At this stage the *besan* (chickpea) flour can also be added if desired to help bind the paste. Divide the paste into small portions (tablespoon size) and deep fry over a medium heat until golden brown. Serve the pakoras with a mint or tamarind chutney.

KICHARI (KICHERI) – Punjabi style again. This dish is recommended in Ayurvedic practice to be pretty much a cure-all for digestive complaints.

Rice, 1.5 cups
 Masoor dhal (*Lens culinaris*) (split, washed), 1 cup
 1 small onion
 cumin seeds 1 tsp
 turmeric 1 tsp
 garam masala 1 tsp
 tomatoes, 2 chopped
 ginger, 1 inch cube, chopped
 oil, 1 tbsp

Boil rice and lentils together in 4 cups of water until soft (10 mins in a pressure cooker, longer in a normal pan). Fry onions and cumin seeds in oil (medium heat) until onions golden. Add ginger and fry for a couple more minutes, and then add tumeric and tomatoes and cook for 5 mins more. Finally add this mixture to the dhal/rice and finish by adding the garam masala. Strict yogis may prefer to leave out the onions from this one as these are considered to be firey in the ayurveda tradition. Onions can be replaced with asafetida. Similarly, in Gujurat, dishes tend to use fewer onions.

There are countless other recipes available on the world wide web including an excellent selection at <http://www.icarda.org/Publications/Cook/12/12.html> (accessed 16 March 2007). Coconut lentils (*Amati*) are a popular dish of Maharashtra and other Southern States of India and are quite different from the northern Indian types by virtue of the fact that they contain grated coconut, jaggery and tamarind pulp as major ingredients (4 oz/1/2 cup/45 g lentils; 2 tbsp. salt 1/2 tsp. turmeric; 5 cups/2 pints/1 liter water; 2 tsp. crushed jaggery (or sugar); 1 tbsp. tamarind pulp; 2 garlic cloves, crushed; 1/2 tsp. mustard seeds, 3–4 green chilies, chopped, a pinch asafetida, 3 tbsp. ghee or oil, 2 1/2 tbsp. grated coconut (fresh, if possible), 1 tsp. coriander leaves (optional), 8 oz/225 g whole black lentils). In Himachal Pradesh, Raj Roopa or Black lentil dhal is popular which differs again by the addition of bay leaves, and the garnish which contains a pinch of mace, cinnamon and ground cloves. Tuver Dhal or Piquant Lentils are popular in Uttar Pradesh, India, and differ again from the base ingredients by the addition of tamarind. In Punjab, lentils are sometimes made into dhal with the addition of Mango juice, fenugreek and nigella seeds to give a local character to the dhal, known as Mahani.

Some of the more unusual preparations include lentil cakes made from raw but soaked and crushed lentils known as *Varhia*. These require 1 teacup red lentils (*Masoor* dhal), 2 tbsp. lentil flour, 1 tsp. caraway seeds, 1 1/2 tsp. garam-masala, 1 tbsp. coriander seeds, 2 tsp. salt, 1/2 tsp. turmeric, 1 tsp. chili powder (optional) small haricot bean-sized lump of asafetida (optional). After sorting and washing the lentils they need on this occasion to be soaked overnight. After draining them the following day they need to be crushed with a mortar and pestle. The crushed lentils are then mixed with the lentil flour (made by grinding lentils in a coffee mill) and the other ingredients in a mixing bowl, kneaded for a few minutes and then left for upto 4 hours in warm place. The mixture is kneaded again before making the mixture into small palm sized cake shapes which can be dried in the sun and stored.

Mongorhis are a similar food but are deep fried in hot oil after making into cakes. Alternatively the entire lentil component can be ground to a flour and water used with other ingredients to make into a batter and used to make individual lentil cake or used to coat other vegetables. See <http://www.icarda.org/Publications/Cook/12/12.html> for more details.

5.2. Uses of Lentil Elsewhere in the World

Lentil consumption in Pakistan is estimated at 120,000 tons a year but its production now varies from only 25,000–40,000 tons. Thus Pakistan needs to import up to

95,000 tons every year primarily from Canada, Australia, India and Turkey. The utilization of lentil in Pakistan, Nepal, Sri Lanka and Bhutan are similar to that of India for various preparations like dhal, soups, salads, mixed vegetables and concentrations for animal feeds etc. In Morocco lentil soups are considered as integral a part of the daily diet as they are in South Asia. While outside of South Asia the soups and dhals tend to be more simple in their ingredients and perhaps for the unaccustomed palate, less challenging in flavour than some of the fiery spicy and exciting recipes of the Indian sub-continent, the Moroccans have an equivalent dish in Spiced Bean and Lentil Soup. This can be made from 1 tbsp Olive Oil, 2 chopped Onions, 2 crushed Garlic Cloves, 1 tsp freshly grated Ginger, 1.5L. Water, 200 g or 7oz Red Lentils, 1 × 400 g/14oz tin Chickpeas, 1 × 400 g/14oz tin Cannellini Beans, 1 × 400 g/14oz tin Chopped Tomatoes, 50 g/2oz Carrots, chopped 50 g/2oz Celery, chopped 1 tsp Garam Masala, 1 teasp Ground Cardamom, 1/2 teasp Ground Cayenne Pepper, 1/2 teasp Ground Cumin. Heat the olive oil in a large saucepan, add the onions, garlic, and ginger and sauté gently for 5 minutes. Add the remaining ingredients, bring to a boil for a few minutes then reduce the heat and simmer for 1–1/2 hours until the lentils are soft. Allow to cool a little then transfer half the soup to a food processor or liquidizer and process until smooth. Return the pureed soup to the remaining mixture in the pan, mix well and simmer until heated through. It is served as hot soup. Tunisians also have a passion for dhals but often add mint to give it a local characteristic flavour.

Turkey has had significant economic, political and social changes over the past twenty years. The increase in economic potential has seen the country become one of the major lentil exporters producing 500,000 tonnes of lentils which is approximately 150% more than it consumes (De Graaf, 2004). While traditionally, Turkey was one of the leading lentil consuming countries in the world, the increase in affluence over the past 10 years particularly in urban centers has resulted in changes in food towards other products, such as other grains and meat and a consequential decline in lentil consumption. This is also due to migration from rural to urban centers and an increase in lentil prices (De Graf, 2004). Turks have their own version of dhal or red lentil soup known as Kirmizi Mercimek Corbasi which is again quite different from the more lively South Asian and North African dishes. The ingredients are 1 tbsp. butter, 2 onions, chopped; 1½ cups red lentils; 8 cups veal stock; salt; 1 tsp. paprika; 4 tbsp. minced parsley; ¼ cup wine vinegar; 1 tbsp. flour (sifted); 1 tbsp. butter; 3 egg yolks; 1 cup single cream. The cooking instructions are to melt the butter and fry the onions for 2 minutes and add the cleaned lentils with 2 cups of water and boil until the lentils are tender. Add stock, salt and paprika, bring to boil, and then remove from heat. The cooked lentils and then forced through a sieve or liquidized. The mixture is then returned to the pan and kept hot. The rest of the butter and the flour is used to make a roux and cream then added very gradually away from the heat, stirring all the time. Finally, the egg yolks are well-beaten and combine with this mixture and then added to the purée. The dish is served immediately. Garnish with bread croutons that have been rolled in minced parsley and then spoon the wine vinegar over the dish at the table.

Lentil is mainly grown in Ethiopia for its matured seeds that are consumed in different forms. The seeds of lentil are boiled (Nufro) and salted and consumed as snacks. Split (kik) seeds and powdered flour (shiro) are the two major forms used for making a sauce 'kik watt' and 'shiro watt' that are eaten with Injera (flattened bread made of any cereal such as tef, wheat, barley, sorghum, maize, millets). Whole seeds or powdered lentil are used as soup which is particularly popular in towns (Yetneberk and Wondimu, 1994). It is some times mixed with other food legumes for making different sauces. Whole lentil seeds are boiled and mixed with onion and green chili (pepper) and then put inside wheat flour paste to bake and make 'Sambusa'. Cooked and mashed lentil seeds mixed with green chili and onion 'Azifa' is one of the popular dishes particularly in the north-west part of the country. Elbet (paste from flour) is also commonly used in some parts of Ethiopia. Boiled seeds are sometimes mixed with salad or boiled peeled potatoes to garnish. After separating seeds the straws are used as animal feed while the hard root parts are used as firewood (Bejiga, 2006). One particularly popular recipe among Ethiopians appears to be Amhari Mesir Wat- Ethiopian Lentil Bowl, a recipe which is common to the Ethiopian Jews (Phalashi). The ingredients are 1/2 kg Red lentils (*L. culinaris*), 2 large Onions, 1/2 cup Oil, 3 tbsb Tomato paste, 1/2 tsp Paprika; sweet or hot 1 clove Garlic, 1/2 tsp Ground ginger, 1/4 tsp Black pepper, 1 tsp Salt, and 3 cups Water. Lentils should be sorted and washed first and then soaked for 30 minutes before rinsing and draining. While soaking, peel and finely chop the onions and mash the garlic. Heat the oil in large pan and sauté the onion until golden. Add the tomato paste and the paprika and mix. Add half the water and the garlic, ginger pepper and salt. Stir well and then add the rest of the water, stir again, cover and bring to boil. When the water boils, add the lentils, lower the flame and cook 20–30 minutes, until the lentils soften.

Another Jewish recipe with lentil surrounds tradition at Purim when seeds, nuts and pulses are eaten. This arose from the story of Queen Esther who was living in the King's palace in Persia but as a Jew was not allowed to eat non-kosher food at Royal banquets and so lived on a diet of seeds, nuts and pulses. The recipe uses small green lentils that come from central France. These tiny lentils have a distinctive nutty flavor and texture and keep their shape and colour during cooking. The ingredients are 2 tbsp olive oil; 1 leek (trimmed and diced); 2 sweet potatoes and 3 carrots (peeled & diced), 250 g green (Puy) lentils, 2.5 cm piece fresh ginger – peeled and grated, 750 ml hot vegetable stock, 3 oranges – peeled and cut into segments, 200 g spinach leaves and Salt and freshly ground black pepper – to taste. The garnish consists of 2 tablespoons whole toasted almonds; Sea salt and freshly ground black pepper and 1 tsp dried coriander. Heat the olive oil in a large frying pan and sauté the leek, sweet potatoes, carrots and ginger together for 10 minutes. Stir in the lentils and add the hot vegetable stock. Cover and leave to simmer for 40 minutes. When the lentils are completely cooked, stir in the spinach leaves and orange segments and remove from the heat. Toast the almonds in a separate pan with no oil. Season with sea salt, freshly ground black pepper and dried coriander. The required cooking time is about one hour for this dish.

A good example of how lentils can be used to enhance a meat dish as is most often their use in Europe is in the dish known as Potage Saint Hubert which makes a good spicy Christmas soup. Ingredients are 1 lb/450 g soaked brown lentils, 1 onion; 1 leek; thyme; bay leaf; salt and pepper; 1 pheasant; 4 fl oz/100 ml cream. The soaked lentils are cooked in salted water with the onion, the white of the leek, thyme, bay leaf and seasoning. The pheasant is roasted and when cooked the meat is carved from the bone and the best fillets set aside and diced. The rest of the meat is pounded in a mortar. The lentils are strained (reserving the stock) and are added to the meat which is sieved or liquidize and return to the saucepan. This is then thinned with the lentil stock, continuing to add it until the soup is the desired consistency. When it is hot stir in the cream and the diced pheasant. Any cold game could be used for this dish.

Lentil soup in parts of the middle-east is made with bone marrow, but in Lebanon there is a version that is renowned in the region and known as Makhlouta or Lentil Soup with Beans and Rice. The ingredients for this dish are 1 cup lentils; 1 cup chickpeas; 1/2 cup dried black beans; 1 cup rice; 1/2 cup olive oil; 1/2 cup minced onions; 1 1/2 tsp. salt; 1/2 tsp caraway seeds; 5 cups water. Beans, lentils and chickpeas are washed and then soaked together overnight. Drain, cook with water and salt for 15 minutes under pressure (Pressure cooker). The rice should be boiled separately before adding to the lentil/bean mixture. Onions should be fried in oil until slightly browned and then added with the salt and caraway seeds to the beans and lentils and this is simmered uncovered until well blended. A similar version is also made in Lebanon and Syria called Shawrabat Adas (Lentil Soup) which is made with lentils, Swiss chard leaves or spinach, fresh coriander leaves or celery, garlic cloves, lemon juice, tomato purée and flour. An Iranian equivalent uses ground beef and cinnamon.

Lentil is an ancient crop. It is straight forward to cultivate in many different agro-ecosystems and with such a variety of ways of eating the seeds and all the evidence to show how important it is nutritionally it will continue to be of huge importance across the world for the foreseeable future. The availability of modern technologies and even the prospects of genetic enhancement of lentils may help enhance production to levels unimaginable today but the lentil is above all likely to continue to provide a major high nutrient value – low cost ingredient in the diet of the worlds less well off.

REFERENCES

- Abdelgawad, A.S. 1993. Effect of Domestic Processing on Oligosaccharide Content of Some Dry Legume Seeds, *Food Chemistry* 46 (1): 25–31.
- Adsule, R.N., S.S. Kadam, and H.K. Leung. 1989. Lentil. In: CRC hand book of world food legumes (eds. D.K. Salunkehe and S.S. Kadam). Boca Raton, Florida, USA: CRC Press.
- Anon, 2006 http://www.agr.gc.ca/mad-dam/index_e.php?s1=pubs&s2=bi&s3=php&page=bulletin_17_08_1_2004-05-28&PHPSESSID=1539ae40619abe5e07149cdfc6631797 (opened 16 March 2007)
- Araki, R., Maruyama, C., Igarashi, S., Yoshida, M., Maruyama, T., Satoh, T., Yoshida, M., Umegaki, K. 2006. Effects of short-term folic acid and/or riboflavin supplementation on serum folate and plasma

- total homocysteine concentrations in young Japanese male subjects, *European Journal of Clinical Nutrition*, 60: 573–579.
- Araya H, Contreras P, Alvina M, Vera G, Pak N 2002 Comparison between an in vitro method to determine carbohydrate digestion rate and the glycemic response in young men. *European Journal of Clinical Nutrition*. 56 (8): 735–739.
- Bhattacharya, S., Narasimha, H.V., Bhattacharya, S. 2005. The moisture dependent physical and mechanical properties of whole lentil pulse and split cotyledon *International Journal of Food Science & Technology*, 40, 213–221.
- Brand-Miller, J.C., Thomas, M., Swan, V., Ahmad, Z.I., Petocz, P., Colagiuri, S. 2003 Physiological validation of the concept of glycemic load in lean young adults. *Journal Of Nutrition* 133 (9): 2728–2732.
- De Graf, J. 2004. http://ats.agr.ca/europe/3864_e.htm (opened 16th March 2007)
- Duke, J.A. 1981. Handbook of legumes of world economic importance. Plenum Press, New York. p. 52–57.
- Flight, I., and Clifton, P. 2006. Cereal grains and legumes in the prevention of coronary heart disease and stroke: a review of the literature. *European Journal Of Clinical Nutrition*, 60 (10): 1145–1159.
- Bejiga, G. 2006: *Lens Culinaris* Medik. In: Plant Resources of Tropical Africa. 1, Cereals and Pulses (Brink, M & G. Belay eds.) Prota Foundation, Wageningen, Netherlands / Backhuys Publishers, Leiden, CTA, Wageningen, Netherlands pp 91–96.
- Giugliano, D., Esposito, K. 2005. Mediterranean diet and cardiovascular health Natural Products and Molecular Therapy. *Annals of the New York Academy Of Sciences*, 1056: 253–260.
- Hardacre, A.K., Clark, S.M., Riviere, S., Monro, J.A., Hawkins, A.J. 2006. Some textural, sensory and nutritional properties of expanded snack food wafers made from corn, lentil and other ingredients. *Journal of Texture Studies*, 37 (1): 94–111.
- Huisman, J. and van der Poel, A.F.B. 1994. Aspects of the nutritional quality and use of cool season food legumes in animal feed. p. 53–76. In: F.J. Muehlbauer and W.J. Kaiser (eds.), *Expanding the Production and Use of Cool Season Food Legumes*. Kluwer Academic Publishers. Dordrecht, The Netherlands.
- Hulse, J.H. 1994. Nature, composition and utilization of grain legumes. p. 11–27. In: ICRISAT. *Uses of tropical grain legumes: Proceedings of a consultants' meeting, 27–30 Mar, 1989*. ICRISAT Center, India, Patancheru, A.P. 502 324. India:ICRISAT.
- Iliadis, C. 2001. Effects of harvesting procedure, storage time and climatic conditions on cooking time of lentils (*Lens culinaris* Medikus). *Journal of the Science of Food and Agriculture* 81 (6): 590–593.
- Iqbal, A., Khalil, I.A., Ateeq, N., Khan, M.S., 2006. Nutritional quality of important food legumes. *Food Chemistry*, 97 (2): 331–335.
- Jumbunathan, R., Blain, H.L., Dhindsa, K.S., Hussein, L.A., Kogure, K., Li-Juan, L. and Yousef, M.M. 1994. Diversifying use of cool season food legumes through processing. pp. 98–112. In: F.J. Muehlbauer and W.J. Kaiser (eds.) *Expanding the Production and Use of Cool Season Food Legumes*. Kluwer Academic Publishers. Dordrecht, The Netherlands.
- Kay, D. 1979. Food legumes. Tropical Development and Research Institute (TPI). TPI Crop and Product Digest No. 3. p. 48–71. UK.
- McGovern, P.E., Glusker, D.L., Moreau, R.A., Nunez, A., Beck, C.W., Simpson, E., Butrym, E.D., Exner, L.J. and Stout, E.C. 1999. A funerary feast fit for King Midas. *Nature*, 402 (6764): 863–864.
- Muehlbauer, F.J., Cubero, J.I. and Summerfield, R.J. 1985. Lentil (*Lens culinaris* Medic.). p. 266–311. In: R.J. Summerfield and E.H. Roberts (eds.), *Grain Legume Crops*. Collins, 8 Grafton Street, London, UK.
- Muehlbauer F.J. and Tullu A. 1997. <http://www.hort.purdue.edu/newcrop/cropfactsheets/lentil.html> (accessed 16 March 2007).
- Rani, B. and Kawatra, A. 1994 Fibre Constituents of Some Foods. *Plant Foods for Human Nutrition*. 45: 343–347.

- Roberts, D.C.K., Truswell, A.S., Bencke, A., Dewar, H.M. and Farmakalidis, E. 1994. The Cholesterol-Lowering Effect of a Breakfast Cereal Containing Psyllium Fibre. *Medical Journal of Australia* 161 (11–12): 660–664.
- Sarker, A., and Erskine, W. 2006 Recent progress in the ancient lentil *Journal of Agricultural Science* 144: 19–29.
- Singh, U. 1999. Cooking quality of pulses. *Journal of Food Science and Technology-Mysore* 36 (1): 1–14.
- Singh, U. and Jambunathan, R. 1982. Changes in starch, oligosaccharides and soluble sugars in developing pod wall and seed of chickpea *Phytochemistry*, 21, 297–299.
- Van der Maesen, L.J.G. 1972. *Cicer* L., a monograph of the Genus, with special reference to the chickpea (*Cicer arietinum* L.), its ecology and cultivation, *Commun. Agric.* University. Wageningen
- Viadel, B., Barbera, R., Farre, R. 2006. Uptake and retention of calcium, iron, and zinc from raw legumes and the effect of cooking on lentils in Caco-2 cells. *Nutrition Research*. 26 (11): 591–596.
- Wang, N., and Daun, J.K. 2006. Effects of variety and crude protein content on nutrients and anti-nutrients in lentils (*Lens culinaris*) *Food Chemistry*, 95: 493–502.
- Williams, P.C. and U. Singh. 1988. Quality screening and evaluation in pulse breeding. p. 445–457. In: R.J. Summerfield (ed.), *World Crops: Cool Season Food Legumes*. Kluwer Academic Publishers, Dordrecht The Netherlands.
- Williams, P.C., R.S. Bhatta, S.S. Deshpande, L.A. Hussein and G.P. Savage. 1994. Improving nutritional quality of cool season food legumes. p. 113–129. In: F.J. Muehlbauer and W.J. Kaiser (eds.), *Expanding the Production and Use of Cool Season Food Legumes*. Kluwer Academic Publishers, Dordrecht, The Netherlands.
- Yetneberk, S, and Wondimu, A. 1994 Utilization of cool season food legumes in Ethiopia *In* Asfaw Telaye Geletu Bejiga, Saxena, M. C. and Solh, M.B.(eds). *Cool –season Food Legumes of Ethiopia*. Proceedings the First National Cool – season Food legumes Review Conference, 16–20 December, 1993, Addis Ababa, Ethiopia. ICARDA/Institute of Agricultural Research, ICARDA, Aleppo, Syria. 60–75.
- Zapata, L., Pena-Chocarro, L., Perez-Jorda, G., Stika, H.P. 2004. Early Neolithic agriculture in the Iberian Peninsula *Journal of World Prehistory*, 18 (4): 283–325.

WEBSITES PROVIDING USEFUL ADDITIONAL READING ON CONSUMPTION AND USE OF LENTILS

- <http://www.icarda.org/Publications/Cook/12/12.html>
- http://www.puritan.com/vf/healthnotes/HN75_English/Recipe/Lentil_Turkey_Soup.htm#Ingredient-List
- <http://www.ivu.org/recipes/african/shurit-j.html>
- <http://www.ivu.org/recipes/african/nile-j.html>
- <http://www.ivu.org/recipes/african/amhari-j.html>
- <http://www.icarda.org/Publications/Cook/3/3.html>
- <http://www.natashascafe.com/html/menu.html>
- <http://www.foodreference.com/html/russian-red-lentil.html>
- <http://www.jewishcooking.com>
- <http://www.hort.purdue.edu/newcrop/cropfactsheets/lentil.html>