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UrbanFarm[®] Application Manual



A Rotary Club may be thought of as a group of people whose diverse skills and experience provide an extremely effective “think tank” as well as a nurturing environment for new ideas. UrbanFarm[®] has been developed in just such a productive forum at the Rotary Club of Rochdale England.

THE ACCESSIBLE EDDIBLE© GROWTH PROJECT

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THE UrbanFarm® VERTICAL GROWBAG MANUAL

AS THE GROWBAG PRINCIPAL MAY BE USED ANYWHERE ON THE PLANET THIS MANUAL PROVIDES BASIC GUIDANCE THAT MAY REQUIRE SLIGHT ADJUSTMENTS TO SUIT LOCAL CONDITIONS.

1. ADVANTAGES

This system is very simple to use, extremely low cost, organic, requires minimal water, is capable of producing vegetables and fruit in large quantities and requires no traditional planting beds, just any area in

which to hang the bags. An **UrbanFarm**® may be set up on a hard surface such as a concrete plinth or on a solid flat roof strong enough to carry the weight of the VERTICAL GROWBAGS, or on land fill / brown field sites.

UrbanFarm® can provide a valuable source of food or income particularly for landless people who are living in extreme poverty in developing countries.

It can also be used as a way to make profit from the sale of vegetables and fruit for voluntary and commercial organisations, provide rewarding quality employment for unskilled workers or as an educational tool for schools and colleges.

Vertically mounted GROWBAGS are better equipped to withstand flood, drought or long periods of wet or dry weather. For drought conditions, only tiny amounts of water will be required for crop survival when compared to the soak away losses experienced when cultivating ground based plants. During periods of high rainfall the bags may be clipped, tied closed or sheltered to prevent the crop from drowning. Aluminium drink or food tin cans may be cut open, flattened and joined together to make excellent recycled sun or rain shades. If bags do become flooded a small hole pierced in the bag (see 3.3.11) will quickly drain the excess water. If flooding is likely, the bags may be hung above the likely high water level.

People with disabilities, small children and older people find the system easy to work with as the bags may be fixed at a height that suits their level of access. Additionally with the bag height correctly set, ground pests and foraging animals find great difficulty reaching the growing crops.

The system can be used in low lying areas close to the sea where regular flooding causes long term salt contamination of arable land. Careful choice and location of suitable bag carrier frames can keep the growing crops above the flood water level. If the growing crops are in danger of

being overwhelmed by the sea water, pre-packed compost stored in a safe area will allow for a very fast resumption. This may be a particular advantage when local arable land is too contaminated to allow growing prior to de-salinization of the land.

To date (October 2013) the system has been tested in the UK, Kenya and Bangladesh where it provides a means of reducing extreme levels of poverty using ultra low cost, appropriate, locally available technology, particularly in difficult urban environments.

2. SETTING UP A VERTICAL GROWBAG PROJECT

The VERTICAL GROWBAG basics are very simple and only need to be tailored to suit local conditions and resources for wherever on our planet you wish to grow your vegetables and fruit.

2.1 Types of bag. This will depend on what is available to you locally and ideally at no cost. Plastic supermarket carrier bags will do the job and provide a practical way of using what is often seen as an environmentally unfriendly item. If you have plastic bags that are not strong and may easily burst, just put one bag inside a second or third until they have enough strength to carry the crop. (See additional detail on drainage at 3.3.12.)

The bag doesn't have to be plastic but is best when you have little water available for on-going irrigation. In some countries Urban Farmers are using empty cement bags (not the paper type) that are strong and durable. Using plastic bags will minimise water loss and is particularly useful in arid climates. Additionally a plastic bag will allow some of the water that evaporates from the compost / soil growth medium to condense on the wall of the bag, run back down, and return to the crop. This will tend to happen during the evening as the air temperature drops and again will help if water is not easily available.

A cloth bag or sack may also be used. This can be sewn together using old recycled material (see FIG 9) and can be used alone or lined with a plastic bag. The cloth bag will provide the strength to carry the crop and any thin plastic bag will contain the growing plant and minimise water loss.

Additionally a cloth bag can have openings cut into it and several plants grown from within the same bag. This can be done if you have very strong bags of any material.

If a water shortage is likely, remember that you will lose more water from an unlined cloth bag than a plastic one. Also a cloth bag may rot over time.

If water is freely available, you could use only a manufactured or recycled cloth bag. An alternative might be material sewn in the shape of a trouser leg, with string passing through and hung in a U shape arrangement (see FIG 2). This will be able to carry two plants. Thin plastic tube will do the same job. Your imagination together with locally available materials will always provide an answer.

2.2 Fixing and supporting the bags.

There are many ways of doing this. The following photographs suggest different ways of hanging the bags but there are many other methods depending on the site and locally available materials. Just do what works for you.

The first thing is to look around and see what local structures are already available that can be used at no cost.

If you have a pre-existing fence or wall (FIG 1), there may be little choice as to where you are able to hang your bags. However, you

might be able to choose the side of the wall or fence that gives you the best exposure to sunlight and shade.



FIG 1. Using an existing fence or wall



FIGURE 2. Plastic or cloth tubing

The tube above has a string threaded through it then filled with compost. A fruit or vegetable plant may be grown at both ends of this tube.



FIGURE 3. Using house roof timbers to support the bags



FIG 4. Using tree branches when available



FIG 5. A double row bamboo carrier frame.

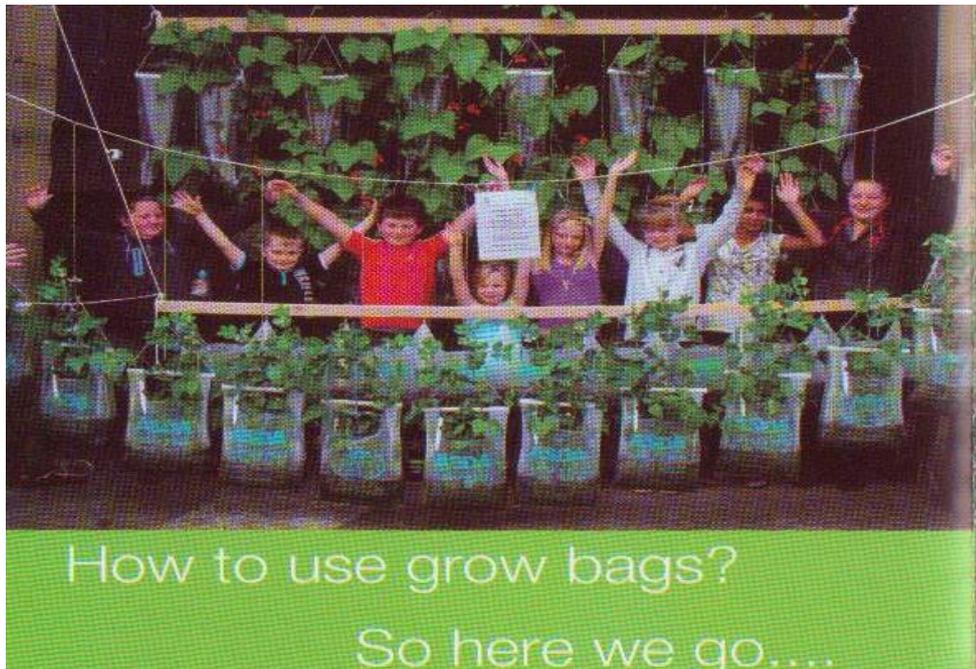


FIG 6. Using a rope line



FIG 7. Carrier frames

For a GROWBAG carrier frame (FIG 7) minimise cost by using discarded or second hand timber. Remember that using carrier frames is the most expensive way of doing the job and simpler methods mentioned in 2.2 above will be much cheaper.

If possible fix the horizontal line of the frame in a north / south direction as with the sun tracking from East to West. This will give the bags the best chance of an even coverage. Also if the weather is particularly warm, a crop hanging over the side of a bag facing east will see the sun for the first half of the day then have the benefit of shade for the second half. In extreme temperatures you may have to set up a simple shading system but consider keeping the bags in semi-shade encouraging foliage to reach out for sunlight. Simple shades can be made using for example flattened cardboard boxes, dark plastic sheet or old material hung over the frame when required.



FIG 8 Multiple rows of bags

Always consider how many bags you are able to hang vertically. For example (FIG 8) shows two rows of bags allowing easy access from ground level to manage the crop. However if you have a safe way of reaching higher levels, and you wish to produce larger crop volumes, then several bags may be stacked vertically on the same footprint of land.

If you choose carefully the height of the bags above ground, crops can be farmed by small children or people with disabilities. Simply fix the height of the bag to suit the access level of the farmer, remembering that the ground may need to be suitable for a wheelchair or other mechanical aids used by a disabled farmer.

When choosing the bag height, think about any local grazing animals such as rabbits, goats or chickens and fix the bags above the level that they can reach. Remember you already have an advantage with GROWBAGS as they are not easily reachable by ground pests such as slugs.

FIG 9. A bag manufactured from discarded cloth.



The manufactured cloth bag shown in FIG 9 may be filled with compost and crop directly or have a thin plastic bag inserted to stop water escaping. This plastic bag does not need to be strong as the cloth bag will carry the weight.

3. PLANTING AND GROWING

3.1 Suitable vegetables and fruits for GROWBAG

The most suitable plants are those that produce their crops above ground such as beans or strawberries, rather than below ground such as potatoes or onions.

Examples of crops that grow well are all the bean and pea families, sweet peppers, chili peppers, courgettes, leeks, Pak-Choi, broccoli, kale, Swiss chard, cucumber, strawberries, tomatoes and herbs.

3.2 Growing Medium

3.2.1 If multi-purpose compost is available use this for your first trial. After that you may wish to experiment with a mixture of good top soil, sand, peat, loam, even coconut husk, river silt or shredded newspaper. Try to use whatever local materials that are available.

3.2.2 Our favourite compost recipe is 1/3 grit, 1/3 compost plus 1/3 of any available top soil.

If there are chickens around let them scratch about it in the new batch of compost before you use it, they will take out and eat any seeds or grubs whilst leaving their valuable droppings behind. Another tip (compost tea) for a boost to existing compost that maybe tired and in the need of some feed - take some fresh compost and put it in a pair of old tights or a stocking, immerse it in water for about 2hours giving it a good stir every fifteen minutes then dilute it with about 3parts water to 1 part tea. Don't store it

but use it immediately.

3.2.3 The lowest cost solution is to make your own compost. The following is a compost recipe sent to us by an UrbanFarm project in Kenya:

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1. *Identify some free ground. This should be as close as possible to where the compost is to be used. The compost is to be made on the ground to allow micro-organisms and worms to enter it.*

2. *The compost heap should be if possible under shade. This will prevent evaporation.*

3. *To make the compost you can use:*

Dried leaves or grass; Animal manure; Composting plants and weeds; Green leaves, grass, shrubs and tree branches; Kitchen scraps; Ash; Soil; River silt (but not from sea water areas); Newspapers; Water.

4. *These materials are laid down in layers step by step. The coarse materials such as shrubs, twigs and thin tree branches are put at the bottom of the heap so air can enter the soil and go through the heap.*

5. *The first layer should be 10 to 20 cm high.*

6. *A little ash is put over the layer then water (not sea water) is sprinkled over each layer until it is wet.*

7. *The process is repeated until the compost heap reaches the desired height.*

8. *The heap is to be turned over every 2 weeks using a fork and all the layers are mixed together.*

9. *Keep turning every 2 weeks for about 8 weeks when the compost will be ready for use. This period may vary depending on the temperature and humidity of the season.*

.....

(Fig 10).



Fig 10. Selecting compost

3.3 Preparing, planting and caring for your crop.

3.3.1 Half fill a standard 10 Litre bucket with compost. Try for around 5 to 7.5 litres in your bag. Once again experiment (Fig 11).



Fig 11. Measuring the compost

3.3.2 Hold the open bag across part of the bucket and tip the compost into the bag (Fig 12).



Fig 12. Filling the bag

3.3.3 Level the compost in the bag and plant seeds or “plug” plants as per the accompanying instructions (Fig 13).



Fig 13. Levelling & planting

3.3.4 Hold the bag by the handles and give it a downward shake. This will gently compact the compost (Fig 14). Hang the bag up by one of the methods shown in the following pictures.



Fig 14. Compacting the compost

3.3.5 There are various methods of supporting the bag. In Figure 15 an inexpensive cane is pushed through the bag handles. The bags may then be hung in one of the ways shown in for example Figs 1 to 7.



Fig 15. A cane support

3.3.6 Figure 16 shows a method of attaching string to the cane then hanging it from any available point.



Fig 16. A cane & string support

3.3.7 The bag can also be supported by nails or hooks embedded in any length of available timber (Fig 17). Once again experiment using any locally available materials.



Fig 17. A timber support using nails or hooks to carry the bag

3.3.8 Add 1 1/2 Litres / 2 pints of water to each bag. When the water has been added NEVER put the bag down on a flat surface always keep it hung up.

3.3.9 Check the bag in the late evening. Squeeze the bag with your hand and feel the condition of the compost and roots. The bag should feel firm like your arm, not soft like a bag of water or hard like a stone. If the bag feels too dry add water.

3.3.10 Ideally the compost should be moist throughout the bag with the bottom 2.5cm / 1 inch being wetter. This will provide a “reservoir” of water that the compost will soak up.

3.3.11 If you are concerned with over watering when water is plentiful, you can put two or three holes in the bag 2.5cm / 1 inch from the bottom. This will allow any excess water to drain out and maintain the reservoir mentioned in 3.3.10.

3.3.12 In non-arid climates when water is freely available if you are using two bags to give extra strength, you can provide extra drainage by cutting the lower corners off the outer bag (Figs 18 & 19).



Fig 18 Extra drainage



Fig 19 Two bags with extra drainage

“STRETCHER” GROWING SYSTEM.



Fig 20



Fig 21

Planters can be made from stout bamboo, timber or steel. They can be made to a height to suite the individuals using them and are particularly useful for farmers with mobility problems or who are in a wheelchair.

In flood areas they can be set to a height that will hold the growing platforms above the flood level.

The planter can hold grow bags of compost or bulk compost. If you lift the stretcher off and place it on the floor, the compost and the crop will just open out. When you lift the stretcher back onto its frame the compost will easily fold back in place.

The stretcher material is preferably made from synthetic fabric i.e. Polyester/nylon/polypropylene etc., as these will not be attacked by micro-organisms. If the fabric is coated with PVC, any spillage from crop watering or rain water can be poured out so no water is wasted.

TRADE ENQUIRIES WELCOME

Our trials have demonstrated that commercial **UrbanFarm**® applications can be profitable. As an example, in Britain one plastic bag, compost and seed planted with Tumbling Tomatoes will cost approximately £0.47 per bag. The average bag will produce 2.5Kg of tomatoes in one season. The Supermarket retail price for tomatoes this year (2013) is £4 per Kg. In this idealized situation a £0.47 investment would return £10, hence this has both charitable and commercial possibilities.

We have the registered designs for hanging and suspending the bags and we have two registered trademarks **UrbanFarm**® and **Accessible Edibles**®.

Our applications have open use for those involved in charitable work however we would expect commercial organisations that can manufacture and market the above to contribute a negotiable Royalty / Licence fee.

One hundred per cent of these fees will be faithfully used for local, National and International Rotary Charities.

3.4 A PERSONAL MESSAGE TO YOU FROM ROCHDALE ROTARY CLUB

We have been carrying out trials of VERTICAL GROWBAGS for some years now and have received many helpful suggestions from friends around the world to help us improve what we have.

Now it's your turn if you would like to join us in this uniquely inexpensive way of growing food without the need for land. Any VERTICAL GROWBAG experience that you have that other users may benefit from is important. We will always add valuable comments to the latest edition of our Application Manual

Please email your comments to: contactus@accessible-edibles.org

Our website address is: www.accessible-edibles.org

If you have no access to the World Wide Web you can also send your comments by post to.

Rochdale Rotary Club
 Rochdale Masonic Buildings
 Richard Street
 Rochdale OL11 1DU England.

With your help Accessible Edibles will become the way to grow nutritious food anywhere on Earth.

APPENDIX A. FUNDING YOUR PROJECT

ISSUE 1. 11.2.14

Our **UrbanFarm**® project was developed for the purpose of feeding very poor, destitute people who do not have enough food to eat, and this will always be our top priority.

However our project development work has taught us that once the basic human need for food is satisfied, there is also an excellent opportunity for the growth and profitable sale of vegetables and fruit. This helps promote independence particularly for women.

It may take two different routes. Firstly basic crops can be grown and sold or, crops that are expensive to buy on the local market can be grown and sold, with the profit being used to buy basics with which to feed the UrbanFarmer.

So, organisations that are involved in establishing UrbanFarms in their communities can choose to use a mixture of growing crops to eat and growing crops to sell.

With this in mind, organisations should very carefully consider that once local people have grown enough to eat, establishing an **UrbanFarm**® which already is an exceedingly low cost operation, could move rapidly into being a funding opportunity for that organisation.

The following is a UK based example.

*Our trials have demonstrated that commercial **UrbanFarm**® applications can be profitable. As an example, in Britain one plastic bag, compost and seed planted with Tumbling Tomatoes will cost approximately £0.47 per bag. The average bag will produce 2.5Kg of tomatoes in one season. The Supermarket retail price for tomatoes this year (2013) is £4 per Kg. In this idealised situation a £0.47 investment would return £10, hence this has both charitable and commercial possibilities.*

Remember the above example is for one short U.K. summer growing season. In many developing countries an **UrbanFarm**® growing season may last for most of the year and the yields will be higher than in the above example from the U.K.

CO-OPERATIVE PROFITS

If an organisation encourages a group of people in a community to form an **UrbanFarm**® Co-Operative, this can work in a more productive way than for just an individual. This will produce much higher crop yields. Work can be shared and people with particular skills are able to specialise in using that skill.

If several co-operatives are set up as a group in the local area, the model becomes more powerful. For example a number of Co-Operatives linked together may be able to jointly purchase raw materials such as seed, compost or timber for frames, at a reduced price as they can negotiate this for their larger order.

Additionally, if crops are to be sold, different Co-Operatives in the group may wish to specialise in growing different crops allowing them to become more productive because of their specialist skills.

Another funding idea is that once an organisation has become experienced in **UrbanFarm**® they might consider selling a training course to other charitable organisations or even businesses in their area.

Additionally a starter kit consisting of a bag, a seed and compost may also be sold to local people with advice on how to use this simple technology.

There are many possible organisational funding opportunities for **UrbanFarm**® so please do not look on it in terms of the cost to set one up. There may also be returns other than the main one of poverty reduction.

PLEASE REMEMBER URBANFARM IS A VERY LOW COST PROJECT TO ESTABLISH.

APPENDIX B. UrbanFarmSite Survey Check List ISSUE 2. 11.2.14

NOTE. All Figure references e.g. **FIG 6** refer to the photographs in the UrbanFarm Application Manual.

You MUST read the manual carefully before starting your survey.

1. Choosing a bag

Look to see if any of the following are available:

- 1.1 Plastic Supermarket carrier bags (See **Fig 6 & 7**)
- 1.2 Old cement bags, but not paper (See **FIG 5**)
- 1.3 Any locally available jute or canvas bags
- 1.4 Waste cloth sewn to make a bag (See **FIG 9**)
- 1.5 If you use cloth bags as in 1.4 and you are short of water, place a thin plastic bag or flat plastic sheet moulded to the shape of the cloth bag inside. This will help to minimise water loss.
- 1.6 Plastic tube or material sewn into a tube shape (See **FIG 2**)
- 1.7 Remember if you only have a very small area for your UrbanFarm, the size of the bag and the way you fix them will restrict how many bags may be used in any one location so choose carefully.

2. Choosing how high off the ground to mount the bags

- 2.1 If the site is likely to flood see if you can mount the bags above the height of normal levels of flood.
- 2.2 If a regular and predictable flood comes from sea water, and the land will remain contaminated for a long period after, consider storing bags, compost and seed. This will act as disaster relief allowing conventional farmers to set up temporary UrbanFarms until their land is fit to use again.
- 2.3 If there are grazing animals try to fix the bags above the height they can reach.
- 2.4 If children or disabled people will farm the bags, fix the height of the bag so they can reach them.

3. Fixing the bags

- 3.1 Look for walls or fences to hang the bags from (See **FIG 1 & 3**).
- 3.2 If fixing bags to walls or fences try to select the location for how much sun and shade you want on the bags.
- 3.3 Look for trees that can be used to hang the bags from.
 - 3.3.1 Bags may be hung from branches of the tree (See **FIG 4**).
 - 3.3.2 Bags may be hung from rope/s or line/s tied around a tree trunk.
 - 3.3.3 Bags may be hung from a rope or line/s tied between two or more trees.

- 3.3.4 To increase crop yield, more than one line can be fixed in parallel between two trees but make sure you can safely reach the highest line of bags. This idea is similar to **FIG 5** but using line or rope between trees instead of bamboo between stakes.
- 3.3.5 Finally if nothing seems to be easily available on site, look for anything that can be adapted to carry the bags for example an abandoned or derelict building or a scrap car. Your imagination will always help you to find an answer.

3.4 **CARRIER FRAMES.** You may have to use frames if you have no trees, fences or walls at your UrbanFarm site that you can use. If you have concrete, flags, stony or contaminated land or a solid concrete roof that is strong enough to carry the weight of a large number of growing bags these areas can be used but you will need to make frames.

- 3.4.1 If you have no old wood that can be recycled to make frames and you have to buy wood then beware, this will be the most expensive of all the options.
- 3.4.2 If you have soft ground, the simplest frame will be two stakes driven into the ground with a cross piece length of wood between the stakes. The longer the cross piece the more stakes will be needed. This will look the same shape as football goal posts. The bags can be fixed to the cross piece perhaps in two rows, one on either side of the cross piece.
- 3.4.3 If you have only a hard surface available you will need a full frame with a base similar to **FIG 7**.

4. **COMPOST**

- 4.1 See what is available on site or close to your site.
- 4.2 Speak to local gardeners and farmers to see what they use and how they make it.
- 4.3 If you have to buy compost to start the project, encourage your UrbanFarmers to make their own compost. This will help promote future expansion by your UrbanFarmers.
- 4.4 See if there are enough UrbanFarmers to have a collective self-help compost making service.

5. **SHADING AND PROTECTION**

- 5.1 If the sun will be too hot for the crop, consider supplying flattened cardboard boxes, dark plastic or old material to hang over the bags during the hottest time of the day. Metal drink or food tin cans may be cut open, flattened and joined together to make sun or rain shields.
- 5.2 If heavy or monsoon rains are likely look for simple clips such as washing pegs or strong paper grips to hold the bags closed during rainy spells or try any of the ideas in 5.1 above.

6. **POSSIBILITIES FOR ENTERPRISE AND TRADE**

- 6.1 Consider if there are enough people on site to form a self-help group.
- 6.2 Prioritise growing enough food so the people have enough to eat.
- 6.3 If you have the space to add more bags, think about the future possibility of growing more food, possibly high value crops, so that some may be sold.
- 6.4 If there is only a very small space in which to place your bags, consider growing high value crops to sell, then use the profits to buy basic foods.
- 6.5 Think about high value crops such as chilies, strawberries or any others that are expensive to buy in your local market.

APPENDIX C. THE ADVANTAGES OF USING URBANFARM Issue 3. 30.1.13

1. Extremely low cost and is ideal for use in developing countries.
2. It's organic, uses only tiny amounts of water to maintain and is perfect for growing vegetables and fruits particularly in arid climates.
3. It can provide a valuable source of food for an Urban Farmer. If there are expensive local crops such as chillies or strawberries they can be grown and sold providing funds for a family to buy basic foods.
4. The root system of the crop can be easily felt on a daily basis to check the moisture content. This produces optimum watering.
5. Food can be grown without the need for land, just any urban or rural area in which to hang the bags will be fine.
6. Locally available bags e.g. a plastic shopping bag, recycled cement bag (but not one made of paper) or a bag made from offcut or recycled garment material may be used. A material bag may support a thin plastic bag placed inside to reduce water loss.
7. Such a simple system is very easy to understand and provides quality employment for unskilled workers or as an educational tool for schools or colleges. Only very basic training is needed.
8. An UrbanFarm may be set up on almost any surface such as a concrete plinth, a stone or flagged surface, a flat concrete roof strong enough to carry the weight of the bags, on a fence, on a tree, a wall, a rope line, or on a frame made of bamboo or other discarded timber, contaminated land e.g. following a sea water flood or on a land fill or brown field site. To increase the crop yield several rows of bags can be hung vertically.
9. Only local materials that are free or available at ultra-low cost will be needed. Almost any materials can be adapted to do the job for example river silt, coconut husk or newspaper in the compost. With the ultra-low set up cost and set up time UrbanFarm will change the lives of the poorest and most disadvantaged people on earth.
10. The bags can be hung above the height of grazing animals such as goats, chickens or rabbits. This also makes access difficult for ground pests such as slugs.
11. The height of the bags can be set to suit disabled Farmers or children.

12. When used on a large scale UrbanFarm can produce crops that can be sold commercially.
13. UrbanFarm promotes independent living particularly for women, enterprise and trade and can also help with disaster relief.
14. To see how to set up an UrbanFarm go to www.accessible-edibles.org

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