Plant Basket Liners Of Recycled Wool Carpet Lab Report

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Purpose: The purpose of this lab was to run an investigation to determine if there was a difference in plant growth and vigor between traditional cocoa fiber wire basket liners and recycled wool carpet used as wire basket liners.

Hypothesis: Seven of the Ecology Club students thought that basket #3, the control group, would show the greatest amount of growth and vigor. Cocoa liners are the current commercial standard for wire basket liners. One student thought that group #2 would show the greatest growth and vigor. No reason was given. I believed that the baskets lined with wool would generally do better than the cocoa lined basket because they would conserve water. I thought the glue on the carpet backing would affect growth and vigor due to chemicals leeching from the glue into the potting soil.

Materials: 5/each 24" wire baskets, 5/each 4"x 4" x 10' posts, 5/each mounting hardware, 1/each cocoa fiber basket liner, wool carpet remnants to line four baskets, 5/each irrigation set-ups, potting soil to fill five baskets, annual plants for the five baskets (Blue Moon Lobelia 15 each, Ultra Red Petunia 15 each, Blue Victoria Salvia 30 each, Durango Red Marigold 30 each, camera, notebook.

Procedure: The Harvest Park Ecology Club set up this experiment on April 7, 2008. Five 24", round wire baskets were installed on 4" X 4" posts raised 8' above the ground.

1. All wire baskets were irrigated with identical ¼" laser drip irrigation tubing arranged in two concentric circles. Both circles linked in the center of the basket where the irrigation line came through and charged the system. The basket irrigation system connected to a one-inch irrigation line. A solar controlled irrigation clock watered all baskets consistently every day at 5:00 AM for 5 minutes. The five baskets were located in a horizontal row oriented North to South approximately eight feet apart.
2. A PVC washer was constructed from irrigation pipe. The washer added stability to the pots after they were mounted on their poles.
3. All five baskets were lined with their respective test liners then filled with commercial potting soil. Wool carpet pieces were added the soil mixture of baskets two and five.
4. The baskets received the same plantings of; Blue Moon Lobelia (3/basket), Ultra Red Petunia (3/basket), Blue Victoria Salvia (6/basket), Durango Red Marigold (6/basket). Plants were from healthy flats of annual color plants.
5. Each basket was securely mounted to a 4"x4"x8' post.
6. The irrigation system was connected to the main line then checked.
7. Informal observations were completed weekly. Formal observations were completed monthly.

Observations/Data:
04/07/2008, Set-up and planting

Basket	Test Description	Plants/Basket
1	Wool carpet liner with carpet glue on the backing of the carpet sample.	Lobelia erinus, Blue Moon Lobelia (3/basket) Petunia grandiflora, Ultra Red Petunia (3/basket) Tagetes patula, Victoria Blue Salvia (6/basket) Salvia farinacea, Durango Red Marigold (6/basket)
2	Wool carpet liner with no glue on its backing small one inch square pieces of wool carpet cut up and added to the potting soil	Lobelia erinus, Blue Moon Lobelia (3/basket) Petunia grandiflora, Ultra Red Petunia (3/basket) Tagetes patula, Victoria Blue Salvia (6/basket) Salvia farinacea, Durango Red Marigold (6/basket)
3	Control basket with a traditional cocoa fiber liner	Lobelia erinus, Blue Moon Lobelia (3/basket) Petunia grandiflora, Ultra Red Petunia (3/basket) Tagetes patula, Victoria Blue Salvia (6/basket) Salvia farinacea, Durango Red Marigold (6/basket)
4	Wool carpet liner with no glue on its backing.	Lobelia erinus, Blue Moon Lobelia (3/basket) Petunia grandiflora, Ultra Red Petunia (3/basket) Tagetes patula, Victoria Blue Salvia (6/basket) Salvia farinacea, Durango Red Marigold (6/basket)
5	Wool carpet liner with glue on its backing small one inch square pieces of wool carpet cut up and added to the potting soil	Lobelia erinus, Blue Moon Lobelia (3/basket) Petunia grandiflora, Ultra Red Petunia (3/basket) Tagetes patula, Victoria Blue Salvia (6/basket) Salvia farinacea, Durango Red Marigold (6/basket)

Weather: 04, 2008

Temperature:	Max:	Avg:	Min:
Max Temperature	**90** °F / **32** °C	**70** °F / **20** °C	**57** °F / **13** °C
Mean Temperature	**70** °F / **21** °C	**56** °F / **13** °C	**47** °F / **8** °C
Min Temperature	**49** °F / **9** °C	**42** °F / **5** °C	**34** °F / **1** °C

Precipitation:	Max:	Avg:	Min:	Sum:
Precipitation	**0.01** in / **0.0** cm	**0.00** in / **0.0** cm	**0.00** in / **0.0** cm	**0.01** in / **0.03** cm

Wind:	Max:	Avg:	Min:
Wind	**28** mph / **45** km/h	**7** mph / **11** km/h	**0** mph / **0** km/h
Gust Wind	**35** mph / **56** km/h	**21** mph / **33** km/h	**16** mph / **26** km/h

Notes/Observations: All plants were healthy and approximately the same age and size on April 7th. The plants were colorful annuals, nursery grown in flats. We had trace amounts of rain in April our watering system functioned perfectly. There were several windy days that tended to stress the plants. Some extra water was applied to help the plants take root and adjust to their new surroundings. Plantings grew steadily through the first month. I did not rate the basket growth in April.

Ground View Order/Observations: All the baskets look equal at planting time. There are no observable differences between the plantings in the month of April.

Observations/Data: 05, 2008

Basket Number & Description	Lobelia erinus (Blue Moon)	Petunia grandiflora (Ultra Red)	Salvia farinacea (Victoria Blue)	Tagetes patula (Durango Red Marigold)	Overall rating of basket 1=low 5=high
1) Wool carpet liner, carpet glue on backing of sample.	Lobelia was very healthy and covered with abundant flowers. Height 15 cm	Height 18 cm, Many flowers in bloom.	Height 26 cm Some flower buds are forming on the tips of the stems.	Height 16 cm, Flowers are looking healthy, some needed to be deadheaded.	4
2) Wool carpet liner, no glue on sample backing, one inch square pieces of wool carpet cut up and added to the potting soil	Lobelia was very healthy and covered with abundant flowers. Height 18 cm	Height 17 cm, Many flowers in bloom.	Height 26.5 cm Flower buds are forming on the stem tips.	Height 14 cm, Flowers are looking healthy, some needed to be deadheaded.	3
3) Control basket with a traditional cocoa fiber liner	Bushy and compact but no flowers. Height 20 cm	Height 21 cm, Some flowers in bloom.	Height 31 cm The flower buds are developing at a faster rate than the other pots. Flowers look leggy.	Height 17 cm, Flowers are looking healthy, some needed to be deadheaded.	1
4) Wool carpet liner with no glue on its backing.	Bushy and compact but no flowers. Height 19 cm	Height 23 cm, Some flowers in bloom.	Height 32.5 cm Some flower buds are forming on the tips of the stems.	Height 15 cm, Flowers are looking healthy, some needed to be deadheaded.	2
5) Wool carpet liner with glue on its backing small one inch square pieces of wool carpet cut up and added to the potting soil	Best Lobelia, more compact than the other pots, covered with flowers. Height 15 cm	Height 18 cm, Many flowers in bloom.	Height 29 cm Flower buds are forming on the stem tips.	Height 14 cm, Flowers are looking healthy, some needed to be deadheaded.	5

Notes/Observations: The weather this month was warm but not too hot. We have been free of rain and harsh winds. The drip irrigation system followed the regular watering schedule. No extra water was applied. All the baskets are growing and flowering nicely. The one that stood out as most vigorous overall was basket #5. #5 plants demonstrated a wonderful balance of compact, healthy foliage and flower production. The Lobelia was a standout. Baskets # 1 & 2 followed closely together. Both looked healthy and all their flowers were in bloom, just not quite as nicely as #5. Baskets #3 & 4 were the final pair for this observation. The Lobelia looked bushy but lacked flowers. Basket #3 demonstrated the least amount growth of all the observations this month. It looked leggy and lacked energy to produce flowers.

Ground View Order/Observations: While observing each basket from the ground it became very clear that basket #5 looked the best overall. There were no empty spaces in the foliage and the plants looked full and healthy. The other two pairs were actually very close. The temperate weather conditions have allowed all of the baskets to have a great acclamation and early flowering period.

Weather: 5/2008

Temperature:	**Max:**	**Avg:**	**Min:**
Max Temperature	**101** °F / **38** °C	**77** °F / **25** °C	**64** °F / **17** °C
Mean Temperature	**82** °F / **27** °C	**64** °F / **17** °C	**56** °F / **13** °C
Min Temperature	**63** °F / **17** °C	**50** °F / **9** °C	**38** °F / **3** °C

Precipitation:	**Max:**	**Avg:**	**Min:**	**Sum:**
Precipitation	**0.00** in /	**0.00** in / **0.0** cm	**0.00** in / **0.0** cm	**0.00** in /**0.00** cm

Wind:	**Max:**	**Avg:**	**Min:**
Wind	**26** mph / **42** km/h	**8** mph / **13** km/h	**0** mph / **0** km/h
Gust Wind	**37** mph / **60** km/h	**20** mph / **33** km/h	**16** mph / **26** km/h

Observations/Data:06, 2008

Basket Number & Description	Lobelia erinus (Blue Moon)	Petunia grandiflora (Ultra Red)	Salvia farinacea (Victoria Blue)	Tagetes patula (Durango Red Marigold)	Width Of Plant Growth (West side of basket)	Overall rating of basket 1=low 5=high
1) Wool carpet liner, carpet glue on backing of sample.	Height 24 cm Plants flowing over the sides of the basket.	Height 32 cm Plants growing tall looking healthy.	Height 64 cm Bushy multi-stalk plants.	Height 17 cm Look good, deadheads removed	Width 84 cm	4
2) Wool carpet liner, no glue on backing, 1" square pieces of wool carpet cut up and added to the potting soil	Height 27 cm Healthy plants.	Height 31 cm Healthy plants.	Height 65 cm Healthy plants	Height 14 cm Healthy plants	Width 80 cm	2
3) Control basket with a traditional cocoa fiber liner	Height 20 cm Leggy growth	Height 32 cm Fewer flowers than other baskets	Height 20 cm Flower stocks look weak.	Height 19 cm Can be easily seen	Width 70 cm	1
4) Wool carpet liner with no glue on its backing.	Height 25 cm Plants flowed over the basket side heavy	Height 45 cm Plants flowed over the basket side heavy	Height 58 cm Multi-stalked with abundant flowers.	Height 16.5 cm Hard to see due to plant growth. Observed as	Width 110 cm	5

	flowers.	flowers.		flowering and thriving.		
5) Wool carpet liner with glue on its backing small 1" square pieces of wool carpet cut up and added to the potting soil	Height 24 cm Some die back after flowering	Height 63 cm Flowers were fewer in number.	Height 62 cm Bushy multi-stalk plants	Height 14 cm Can be easily seen	Width 74 cm	3

Notes/Observations: This month I added an additional width measurement as the plants started to grow outward over their baskets. During the two previous observations the plants growth was in an upward direction while filing in the planting area. I measured width of each basket as it faced west. The trend in June was for the plants to really fill out and look fantastic. Differences in quality were easily observable. Clearly, the wool-lined baskets are outpacing the control basket in every way. Weather continued to support plant growth with warm temperatures and light winds through the month. There was zero precipitation in the month of June. Watering remained on timer schedule with no additional water offered.

Ground View Order/Observations: Basket #4 took off this month! The Salvia filled the #4 center so fully that I had reach inside to check the Marigolds. Petunias and Lobelia cascaded over the basket edges. Basket #1 lacked fullness but looked almost as nice as #4. Basket #5 had great growth in the height area but lacked fullness of #1 & 4. Basket #2 was healthy overall but the plants were less bushy giving the basket a weaker appearance. Basket #3 definitely had the lowest quality plants. They lacked vigor it was easy to see dirt that was covered in the other baskets.

Weather: 06, 2008

Temperature:	**Max:**	**Avg:**	**Min:**
Max Temperature	**104** °F / **40** °C	**85** °F / **29** °C	**69** °F / **20** °C
Mean Temperature	**85** °F / **29** °C	**70** °F / **21** °C	**59** °F / **15** °C
Min Temperature	**67** °F / **19** °C	**53** °F / **12** °C	**44** °F / **6** °C

Precipitation:	**Max:**	**Avg:**	**Min:**	**Sum:**
Precipitation	**0.00** in / **0.00** in / **0.0** cm		**0.00** in / **0.0** cm	**0.00** in /**0.00** cm

Wind:	**Max:**	**Avg:**	**Min:**
Wind	**23** mph / **37** km/h	**8** mph / **12** km/h	**0** mph / **0** km/h
Gust Wind	**28** mph / **45** km/h	**20** mph / **33** km/h	**16** mph / **26** km/h

Observations/Data: 07, 2008

Basket Number & Description	Lobelia erinus (Blue Moon)	Petunia grandiflora (Ultra Red)	Salvia farinacea (Victoria Blue)	Tagetes patula (Durango Red Marigold)	Width Of Plant Growth (West side of basket)	Overall rating of basket 1=low 5=high
1) Wool carpet liner, carpet glue on backing of	Height 25 cm Flower drop.	Height 34 cm Huge flower drop.	Height 73 cm Some flower drop, best of the basket.	Height 20 cm Huge flower drop.	Width 100 cm	3

sample.						
2) Wool carpet liner, no glue on backing, 1" square pieces of wool carpet cut up and added to the potting soil	Height 29 cm Flower drop.	Height 33 cm Huge flower drop.	Height 77 cm Some flower drop, best of the basket.	Height 17 cm Huge flower drop	Width 77 cm	2
3) Control basket with a traditional cocoa fiber liner	Height 21 cm Flower drop.	Height 34 cm Huge flower drop.	Height 60 cm Some flower drop, best of the basket.	Height 21 cm Huge flower drop	Width 73 cm	1
4) Wool carpet liner with no glue on its backing.	Height 27 cm Flower drop.	Height 49 cm Flower drop.	Height 73 cm +50 flower stocks, best of the basket.	Height 20 cm Huge flower drop	Width 110 cm	5
5) Wool carpet liner with glue on its backing small 1" square pieces of wool carpet cut up and added to the potting soil	Height 26 cm Flower drop.	Height 64 cm Huge flower drop.	Height 63 cm +50 flower stocks, best of the basket.	Height 26 cm Flower drop	Width 100 cm	4

Notes/Observations: All the baskets deteriorated this month, such is the life cycle of an annual flower. Plant energy is now being used to make seeds after pollination. Weather was generally hot with zero rainfall. Water remained on timer schedule. No additional water was offered to the baskets. Wind remained within normal range for our area.

Ground View Order/Observations: It was possible to make observations based on growth (A smaller factor at this stage of the plant life cycle), plant health and overall vigor of each basket. The overall rating order of Baskets this period are; #4 (5), #5 (4), #1 (3), #2 (2), #3 (1). The basis for each rating is basically the same with basket #4 demonstrating the most overall health and vigor and basket #3 demonstrating the least. The most noticeable change was the loss of color-pop from the Petunias and Marigolds. The Lobelia lost flowers as well. Salvia were the strongest plant in each basket, actually they were thriving in baskets #4 and #5.

Weather: 07, 2008

Temperature:	**Max:**	**Avg:**	**Min:**
Max Temperature	**109** °F / **42** °C	**88** °F / **31** °C	**71** °F / **21** °C
Mean Temperature	**89** °F / **31** °C	**73** °F / **22** °C	**62** °F / **16** °C
Min Temperature	**69** °F / **20** °C	**57** °F / **13** °C	**52** °F / **11** °C

Precipitation:	**Max:**	**Avg:**	**Min:**	**Sum:**
Precipitation	**0.00** in /	**0.00** in / **0.0** cm	**0.00** in / **0.0** cm	**0.00** in / **0.00** cm

Wind:	**Max:**	**Avg:**	**Min:**

Wind	**25** mph / **40** km/h	**9** mph / **14** km/h	**0** mph / **0** km/h
Gust Wind	**30** mph / **48** km/h	**21** mph / **34** km/h	**16** mph / **26** km/h

Conclusion: When the Harvest Park Ecology Club offered to participate in this experiment we were intrigued. Could middle school students assist in preliminary research testing used wool carpet as a plant basket liner? Potentially tons of Wool Carpet could be kept out of our local landfills. We were excited!

The purpose of our project was to run an investigation to determine if there was a difference in plant growth and vigor between traditional cocoa fiber wire basket liners and recycled wool carpet used as wire basket liners.

The majority of Ecology Club students thought that the cocoa fiber liner would grow the healthiest plants. They thought this because cocoa fiber liners are sold successfully in plant nurseries and hardware stores. One student thought that basket #2 (Wool carpet liner with no glue on its backing small one inch square pieces of wool carpet cut up and added to the potting soil) would produce the healthiest plants. I believed that the baskets lined with wool would generally do better than the cocoa lined basket because they would conserve water. I thought the glue on the carpet backing would affect growth and vigor due to chemicals leeching from the glue into the potting soil.

It became apparent in May that all the wool carpet liners (#1, #2, #4, #5) would out produce the cocoa fiber control (#3). All of the baskets lined with wool carpet produced large, healthy plants covered abundantly with flowers.

I do believe that +100°F summer heat affected the plants growing in cocoa fiber lined basket, energy was conserved rather than invested in plant growth and abundant flower production. Conversely wool carpet liners held moisture allowing the plants to thrive.

There were no obvious variables that could of interfered with this experiment.

Basket liners made from wool carpet definitely improved plant growth and vigor when compared with traditional cocoa fiber liners.

I have several questions that could be answered by further testing. Does the wool contribute to the soil mix as it breaks down? Do the roots of the plant and/or soil absorb dissolved glue? If yes is the dissolved glue harmful if ingested? How would worms affect the liners? Could wool carpet be recycled as worm food?

To answer the question; I believe recycled wool carpet could successfully replace traditional Cocoa Fiber plant basket liners as used in wire baskets. Engineering tests should be conducted to establish the easiest, most thorough way to line the baskets. After engineering, a wool carpet basket liner should be designed having customer eye appeal. Develop a marketing plan stressing the "green" factor and you have a winner.

Weather data web site;
http://www.wunderground.com