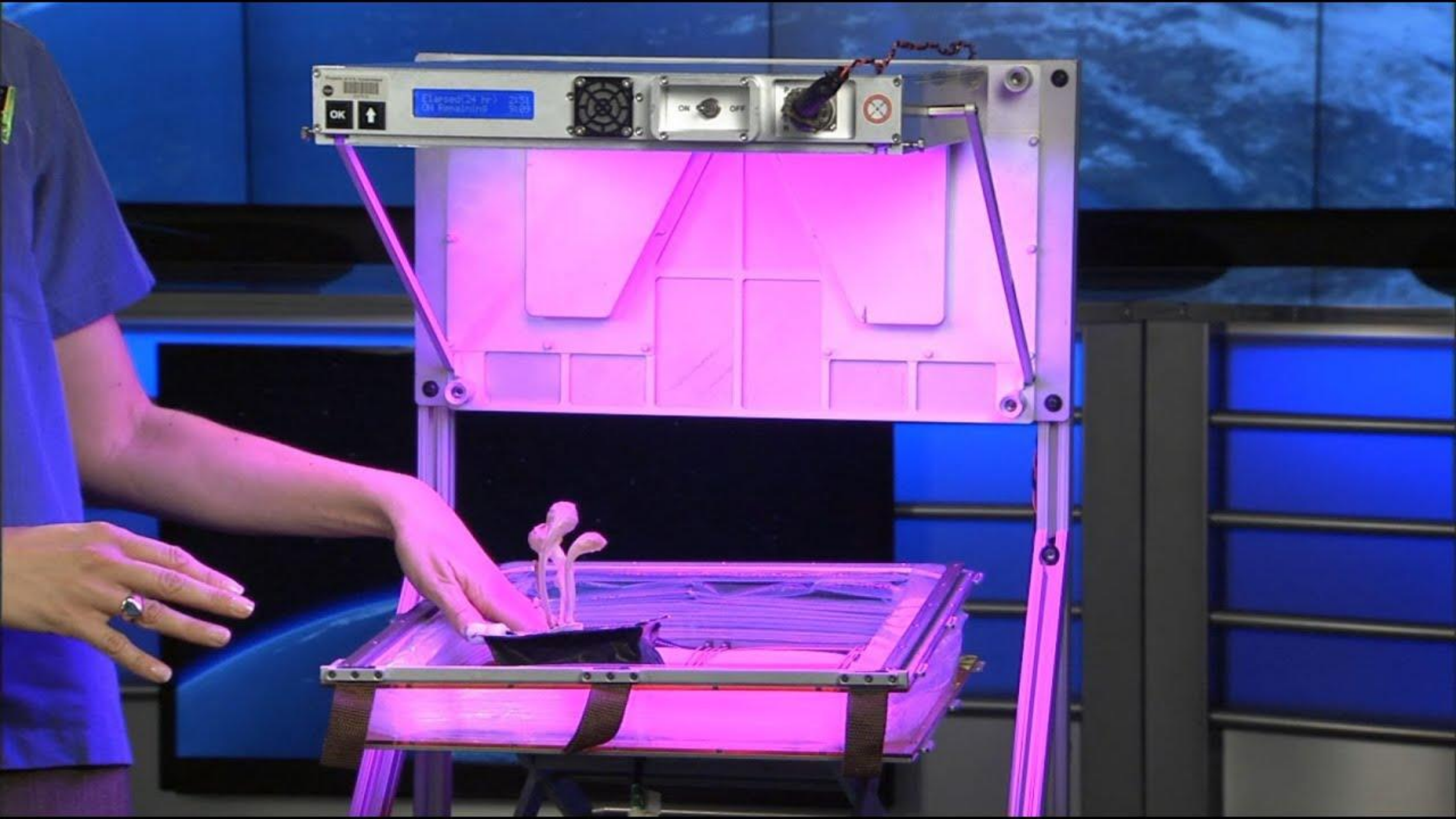
OK
ON
OFF

1
00:00:06,150 --> 00:00:03,990
with the

2
00:00:09,110 --> 00:00:06,160
delay and launch of the

3
00:00:11,350 --> 00:00:09,120
spacex falcon 9 delivering the dragon

4
00:00:12,470 --> 00:00:11,360
spacecraft to the international space

5
00:00:14,709 --> 00:00:12,480
station

6
00:00:17,990 --> 00:00:14,719
there will now be six crew members on

7
00:00:20,550 --> 00:00:18,000
board to assist once it arrives

8
00:00:23,109 --> 00:00:20,560
and births to the station so that they

9
00:00:25,670 --> 00:00:23,119
can assist with unloading and loading of

10
00:00:28,830 --> 00:00:25,680
that cargo vehicle

11
00:00:31,509 --> 00:00:28,840
as mentioned there's quite a number of

12
00:00:34,389 --> 00:00:31,519
experiments uh on board

13
00:00:36,630 --> 00:00:34,399

that dragon spacecraft once it does

14
00:00:38,709 --> 00:00:36,640
launch to the space station

15
00:00:39,590 --> 00:00:38,719
there's also obviously a great number of

16
00:00:44,630 --> 00:00:39,600
uh

17
00:00:47,430 --> 00:00:44,640
its arrival at this station let's go

18
00:00:49,110 --> 00:00:47,440
live to the kennedy space center in

19
00:00:50,630 --> 00:00:49,120
florida where space exploration

20
00:00:53,510 --> 00:00:50,640
technologies

21
00:00:54,790 --> 00:00:53,520
continues that processing for the dragon

22
00:00:56,150 --> 00:00:54,800
cargo

23
00:00:58,470 --> 00:00:56,160
spacecraft

24
00:01:00,549 --> 00:00:58,480
among that cargo is hardware that's

25
00:01:03,029 --> 00:01:00,559
going to support

26
00:01:05,509 --> 00:01:03,039
the largest space garden

27
00:01:06,390 --> 00:01:05,519
ever on this space station it's flying

28
00:01:07,990 --> 00:01:06,400
now

29
00:01:10,070 --> 00:01:08,000
so that the team

30
00:01:11,429 --> 00:01:10,080
can conduct a validation test of that

31
00:01:14,469 --> 00:01:11,439
hardware

32
00:01:16,469 --> 00:01:14,479
joining us this morning is dr joya masa

33
00:01:19,270 --> 00:01:16,479
a project scientist in the station's

34
00:01:21,830 --> 00:01:19,280
ground processing research directorate

35
00:01:24,550 --> 00:01:21,840
down at ksc i think i got that right she

36
00:01:27,590 --> 00:01:24,560
serves as the science team lead

37
00:01:29,830 --> 00:01:27,600
for this payload test and dr masa it's

38
00:01:32,230 --> 00:01:29,840

uh great for you uh you to be here and

39
00:01:34,710 --> 00:01:32,240
thanks for joining us on space station

40
00:01:39,109 --> 00:01:36,710
thanks for inviting me kyle

41
00:01:41,429 --> 00:01:39,119
well you know we've grown uh plants in

42
00:01:43,030 --> 00:01:41,439
space on quite a number of

43
00:01:45,109 --> 00:01:43,040
probably shuttle flights and space

44
00:01:46,630 --> 00:01:45,119
station missions and

45
00:01:49,030 --> 00:01:46,640
but you're actually trying to do

46
00:01:50,789 --> 00:01:49,040
something a little new here give us uh

47
00:01:53,109 --> 00:01:50,799
give us the background on the veggie

48
00:01:56,630 --> 00:01:53,119
experiment and walk us through

49
00:01:59,270 --> 00:01:57,510
sure

50
00:02:01,910 --> 00:01:59,280
so veggie

51
00:02:04,709 --> 00:02:01,920
was designed and built by orbital

52
00:02:07,109 --> 00:02:04,719
technologies corporation or orbitec

53
00:02:09,830 --> 00:02:07,119
a company in madison wisconsin and then

54
00:02:13,510 --> 00:02:09,840
orbitec and nasa collaborated to partner

55
00:02:15,510 --> 00:02:13,520
to bring veggie to flight and veggie was

56
00:02:17,750 --> 00:02:15,520
designed to be

57
00:02:20,869 --> 00:02:17,760
as you said the largest plant garden

58
00:02:23,510 --> 00:02:20,879
essentially on station it's going to

59
00:02:25,830 --> 00:02:23,520
hopefully provide food for the crew

60
00:02:27,910 --> 00:02:25,840
also recreation

61
00:02:29,830 --> 00:02:27,920
will be able to do science within veggie

62
00:02:31,670 --> 00:02:29,840
a lot of different science

63
00:02:33,910 --> 00:02:31,680

related to plant growth

64
00:02:36,070 --> 00:02:33,920
and we expect it to also be something

65
00:02:37,830 --> 00:02:36,080
really interesting for education and

66
00:02:39,190 --> 00:02:37,840
outreach

67
00:02:40,630 --> 00:02:39,200
uh well

68
00:02:43,190 --> 00:02:40,640
we see you've got a

69
00:02:44,949 --> 00:02:43,200
prototype of the flight hardware

70
00:02:47,910 --> 00:02:44,959
there next to you how about giving us a

71
00:02:51,350 --> 00:02:48,790
okay

72
00:02:53,990 --> 00:02:51,360
so veggie consists of an express rack

73
00:02:56,550 --> 00:02:54,000
mounting plate which is the part of the

74
00:02:57,670 --> 00:02:56,560
hardware that will mount to the rack on

75
00:03:00,790 --> 00:02:57,680
iss

76
00:03:02,949 --> 00:03:00,800
and that will hold the led light cap so

77
00:03:05,910 --> 00:03:02,959
a veggie is lit with light emitting

78
00:03:07,750 --> 00:03:05,920
diodes we have red blue and green

79
00:03:11,030 --> 00:03:07,760
the other parts of the hardware are a

80
00:03:12,390 --> 00:03:11,040
transparent accordion like extendable

81
00:03:14,710 --> 00:03:12,400
bellows

82
00:03:17,190 --> 00:03:14,720
and then a reservoir in the bottom which

83
00:03:18,390 --> 00:03:17,200
will provide water to our plants and

84
00:03:19,990 --> 00:03:18,400
then the

85
00:03:23,509 --> 00:03:20,000
plant pillows are the part of the

86
00:03:26,149 --> 00:03:23,519
hardware where we put the the media like

87
00:03:27,910 --> 00:03:26,159
a soil and the fertilizer and we can

88
00:03:29,990 --> 00:03:27,920

plant the seeds in them and then these

89
00:03:32,070 --> 00:03:30,000
will interact with the reservoir and

90
00:03:33,910 --> 00:03:32,080
they're held down with some bungee cords

91
00:03:36,070 --> 00:03:33,920
and so that's how the whole system will

92
00:03:39,750 --> 00:03:36,080
work it's pretty simple it's designed to

93
00:03:42,470 --> 00:03:39,760
be low mass low energy um and it'll

94
00:03:44,550 --> 00:03:42,480
collapse for for launch

95
00:03:46,710 --> 00:03:44,560
that's that's really interesting

96
00:03:49,750 --> 00:03:46,720
what is the uh once it gets on orbit

97
00:03:53,830 --> 00:03:49,760
what's the uh your hardware validation

98
00:03:57,910 --> 00:03:55,910
sure it'll be installed into the express

99
00:03:59,990 --> 00:03:57,920
rack first so there'll be some unpacking

100
00:04:01,750 --> 00:04:00,000
and some construction activities and

101
00:04:04,789 --> 00:04:01,760
then the crew will program it and they

102
00:04:07,750 --> 00:04:04,799
can program the lights the light levels

103
00:04:09,750 --> 00:04:07,760
and colors and also the day night cycle

104
00:04:11,670 --> 00:04:09,760
for the lights

105
00:04:27,110 --> 00:04:11,680
once they do that they'll install the

106
00:04:31,270 --> 00:04:29,110
the pillows and they need to do that to

107
00:04:33,749 --> 00:04:31,280
fill up the pillows with water initially

108
00:04:35,270 --> 00:04:33,759
to start that water column off

109
00:04:38,230 --> 00:04:35,280
once they do that

110
00:04:40,390 --> 00:04:38,240
they will close the unit up and then

111
00:04:42,710 --> 00:04:40,400
fill the water reservoir which can be

112
00:04:44,950 --> 00:04:42,720
accessed externally and that'll start

113
00:04:47,670 --> 00:04:44,960

the plants growing after the plants

114
00:04:49,270 --> 00:04:47,680
start growing there are a few activities

115
00:04:50,870 --> 00:04:49,280
but generally they'll just check it

116
00:04:53,830 --> 00:04:50,880
every day and make sure things are right

117
00:04:56,310 --> 00:04:53,840
they'll thin so we'll have two seeds

118
00:04:58,550 --> 00:04:56,320
planted in each pillow just to make sure

119
00:05:00,870 --> 00:04:58,560
that we get good germination and they'll

120
00:05:02,469 --> 00:05:00,880
reduce that to one plant per pillow

121
00:05:05,350 --> 00:05:02,479
after the plants start growing about a

122
00:05:07,749 --> 00:05:05,360
week after the initiation

123
00:05:09,510 --> 00:05:07,759
and then it'll just be taking some

124
00:05:11,510 --> 00:05:09,520
photographs and refilling the water

125
00:05:13,749 --> 00:05:11,520
reservoir periodically until they're

126
00:05:15,990 --> 00:05:13,759
ready to harvest the plants

127
00:05:18,950 --> 00:05:16,000
now with this first set

128
00:05:21,350 --> 00:05:18,960
we are going to do microbial sampling so

129
00:05:22,950 --> 00:05:21,360
the crew will swab the hardware and the

130
00:05:25,350 --> 00:05:22,960
plants and then they're also going to

131
00:05:28,550 --> 00:05:25,360
harvest the plants and freeze them so we

132
00:05:30,629 --> 00:05:28,560
can bring them back and have food safety

133
00:05:32,469 --> 00:05:30,639
analysis done because we need to make

134
00:05:34,550 --> 00:05:32,479
sure there's nothing harmful growing on

135
00:05:37,110 --> 00:05:34,560
the plants that could endanger the crew

136
00:05:39,110 --> 00:05:37,120
before we allow them to eat anything oh

137
00:05:40,870 --> 00:05:39,120
darn that was that was that was going to

138
00:05:42,390 --> 00:05:40,880

be one of my questions to you because i

139
00:05:44,710 --> 00:05:42,400
know everybody would like to know do

140
00:05:46,870 --> 00:05:44,720
they actually get to to try what they

141
00:05:49,189 --> 00:05:46,880
grow on orbit but i guess not we'll have

142
00:05:50,870 --> 00:05:49,199
to wait till they get back um

143
00:05:53,830 --> 00:05:50,880
talk to us about

144
00:05:55,749 --> 00:05:53,840
how the the differences between this

145
00:05:57,990 --> 00:05:55,759
this greenhouse if you will and others

146
00:05:59,990 --> 00:05:58,000
that have flown previously on uh on

147
00:06:03,270 --> 00:06:00,000
either shuttle flights or other station

148
00:06:07,350 --> 00:06:05,189
right well as you said this is the

149
00:06:08,710 --> 00:06:07,360
largest plant chamber that nasa has ever

150
00:06:11,670 --> 00:06:08,720
flown

151
00:06:14,790 --> 00:06:11,680
and one of the big differences are these

152
00:06:16,550 --> 00:06:14,800
transparent bellows because

153
00:06:18,550 --> 00:06:16,560
for the first time the plants aren't

154
00:06:20,070 --> 00:06:18,560
going to be growing inside a sealed box

155
00:06:23,430 --> 00:06:20,080
they'll be growing in something that the

156
00:06:25,350 --> 00:06:23,440
crew can see and and enjoy as they just

157
00:06:28,150 --> 00:06:25,360
go past this will be in the columbus

158
00:06:30,790 --> 00:06:28,160
module of the space station and so we

159
00:06:32,870 --> 00:06:30,800
think they'll actually you know enjoy

160
00:06:35,510 --> 00:06:32,880
walking past the module

161
00:06:36,790 --> 00:06:35,520
the watering system is also very

162
00:06:39,350 --> 00:06:36,800
different

163
00:06:41,670 --> 00:06:39,360

as i said it's a low energy requiring

164
00:06:44,629 --> 00:06:41,680
unit because we want to be able to grow

165
00:06:47,029 --> 00:06:44,639
plants with less energy input so instead

166
00:06:49,430 --> 00:06:47,039
of using an active watering system like

167
00:06:52,150 --> 00:06:49,440
a pump and an irrigation system we're

168
00:06:53,749 --> 00:06:52,160
using this passive wicking system so

169
00:06:55,510 --> 00:06:53,759
this is the first time we're testing the

170
00:06:56,390 --> 00:06:55,520
system you know we we really hope it

171
00:06:58,629 --> 00:06:56,400
works

172
00:06:59,830 --> 00:06:58,639
but this is a hardware validation test

173
00:07:02,070 --> 00:06:59,840
so that's one of the things we're going

174
00:07:03,990 --> 00:07:02,080
to find out well obviously you may have

175
00:07:07,189 --> 00:07:04,000
touched on this but beyond the food

176
00:07:08,309 --> 00:07:07,199
production itself obviously it this

177
00:07:10,710 --> 00:07:08,319
experiment

178
00:07:12,790 --> 00:07:10,720
can provide an aesthetic or maybe even a

179
00:07:16,550 --> 00:07:12,800
recreational benefit for the cruise on

180
00:07:22,710 --> 00:07:19,430
yeah one of the the goals of this is to

181
00:07:24,710 --> 00:07:22,720
see how the crew enjoy it so we are

182
00:07:26,629 --> 00:07:24,720
providing questionnaire for the crew

183
00:07:28,629 --> 00:07:26,639
both on orbit and when they get back to

184
00:07:30,150 --> 00:07:28,639
earth to see you know how what did they

185
00:07:32,150 --> 00:07:30,160
like what did they not like you know

186
00:07:33,270 --> 00:07:32,160
what what may we want to do different in

187
00:07:35,830 --> 00:07:33,280
the future

188
00:07:39,029 --> 00:07:35,840

um so after they harvest this first set

189
00:07:41,270 --> 00:07:39,039
of lettuce plants our goal is to grow

190
00:07:43,749 --> 00:07:41,280
a second set of pillows that actually

191
00:07:45,430 --> 00:07:43,759
are zinnia they're flour they're small

192
00:07:47,670 --> 00:07:45,440
daisy type flour and they come in

193
00:07:49,589 --> 00:07:47,680
different colors we have an assortment

194
00:07:51,189 --> 00:07:49,599
and this is because you know we know

195
00:07:53,270 --> 00:07:51,199
they that we're not letting them eat the

196
00:07:55,670 --> 00:07:53,280
lettuce initially so we want to give

197
00:07:57,830 --> 00:07:55,680
them something they can enjoy

198
00:07:59,990 --> 00:07:57,840
the frozen lettuce will be brought back

199
00:08:01,189 --> 00:08:00,000
on spacex 4

200
00:08:03,430 --> 00:08:01,199
and

201
00:08:05,029 --> 00:08:03,440
once we do the food safety analysis we

202
00:08:07,110 --> 00:08:05,039
have a third set of pillows up there

203
00:08:08,869 --> 00:08:07,120
that are identical to the first set with

204
00:08:10,710 --> 00:08:08,879
the same lettuce seeds so we're going to

205
00:08:13,189 --> 00:08:10,720
work with the crew office and the flight

206
00:08:15,830 --> 00:08:13,199
surgeons to try and get permission for

207
00:08:17,589 --> 00:08:15,840
the crew to to grow those and eat them

208
00:08:19,589 --> 00:08:17,599
so it just depends on the results that

209
00:08:21,589 --> 00:08:19,599
we get but hopefully they'll enjoy the

210
00:08:24,150 --> 00:08:21,599
flowers and the lettuce

211
00:08:25,990 --> 00:08:24,160
and and you know we expect to see this a

212
00:08:28,070 --> 00:08:26,000
lot when when crew are working in

213
00:08:28,950 --> 00:08:28,080

columbus we should see this unit so i

214
00:08:30,550 --> 00:08:28,960
think

215
00:08:32,389 --> 00:08:30,560
people on the ground may actually get to

216
00:08:33,269 --> 00:08:32,399
see the plants growing too and enjoy

217
00:08:34,790 --> 00:08:33,279
them

218
00:08:36,469 --> 00:08:34,800
well i know you and your team are

219
00:08:38,630 --> 00:08:36,479
excited by it but

220
00:08:40,550 --> 00:08:38,640
i understand also that you have students

221
00:08:44,550 --> 00:08:40,560
that are involved in the development of

222
00:08:49,509 --> 00:08:46,870
that's correct we've had many interns

223
00:08:51,670 --> 00:08:49,519
here over the summer and other semesters

224
00:08:54,070 --> 00:08:51,680
that have helped with the plant science

225
00:08:56,870 --> 00:08:54,080
side of it with the engineering side of

226
00:08:59,190 --> 00:08:56,880
it we also had a couple of high school

227
00:09:01,030 --> 00:08:59,200
science teachers here last summer that

228
00:09:03,110 --> 00:09:01,040
got to help out with things and they

229
00:09:05,269 --> 00:09:03,120
brought this information back to their

230
00:09:06,710 --> 00:09:05,279
classes and shared it and we hope to

231
00:09:09,509 --> 00:09:06,720
continue that

232
00:09:12,630 --> 00:09:09,519
with more teacher training programs in

233
00:09:15,269 --> 00:09:12,640
the future where we use veggie as as a

234
00:09:16,949 --> 00:09:15,279
system that they can be involved with

235
00:09:19,750 --> 00:09:16,959
and translate into some type of

236
00:09:22,550 --> 00:09:19,760
classroom activities orbitech has even

237
00:09:25,110 --> 00:09:22,560
developed a small space garden system

238
00:09:27,190 --> 00:09:25,120

that can be used in the classroom that's

239
00:09:28,630 --> 00:09:27,200
similar to veggie with the same type of

240
00:09:30,630 --> 00:09:28,640
bellows so

241
00:09:32,310 --> 00:09:30,640
we really want to to bring this to the

242
00:09:34,389 --> 00:09:32,320
students as well because

243
00:09:36,870 --> 00:09:34,399
finally we're growing large plants that

244
00:09:40,070 --> 00:09:36,880
people can relate to that they can think

245
00:09:41,590 --> 00:09:40,080
about eating and you know i think

246
00:09:43,910 --> 00:09:41,600
i think that could have a big impact

247
00:09:46,150 --> 00:09:43,920
when when people like students are

248
00:09:47,269 --> 00:09:46,160
thinking about growing their own

249
00:09:50,150 --> 00:09:47,279
vegetables

250
00:09:51,990 --> 00:09:50,160
yeah absolutely well look we we really

251
00:09:53,670 --> 00:09:52,000
appreciate you taking some time joining

252
00:09:55,990 --> 00:09:53,680
us here in mission control today and

253
00:09:58,070 --> 00:09:56,000
talking about uh veggie it's it's very

254
00:10:00,389 --> 00:09:58,080
exciting and people love to watch things

255
00:10:02,150 --> 00:10:00,399
grow i know at my own house i like to

256
00:10:03,670 --> 00:10:02,160
see things turn green

257
00:10:05,910 --> 00:10:03,680
in the springtime so i know the crew

258
00:10:07,670 --> 00:10:05,920
will find that fascinating as well so we

259
00:10:09,670 --> 00:10:07,680
appreciate you joining us and and

260
00:10:11,910 --> 00:10:09,680
hopefully you can come back and talk to

261
00:10:14,069 --> 00:10:11,920
us again uh with some of the results

262
00:10:16,069 --> 00:10:14,079
that you see from this first set of

263
00:10:18,470 --> 00:10:16,079

experiments so thanks again for joining